WESTERN STATES MINERALS CORPORATION

7 December, 1998

Mr. D. Wayne Hedberg
Permit Supervisor
Division of Oil, Gas and Mining
1594 West North Temple, Ste. 1210
Box 145801
Salt Lake City, Utah 84114-5801

Re: Draft Drum Mine Reclamation/Closure Plan

Dear Mr. Hedberg:

Please find enclosed a copy of the Drum Mine Reclamation and Closure Plan (PLAN) in Draft form. Western States minerals Corporation (WSMC) has prepared this document in accordance with state and federal requirements, and per the Settlement and Reclamation Agreement. In order to finalize the document, WSMC is asking for your comments and suggestions such that the PLAN will be acceptable to all parties. Please submit any comments or suggestions to Mr. James Ashton at:

Western States Minerals Corporation
250 South Rock Blvd., Suite 130
Reno, Nevada 89502

Please call me if you have any questions, or need any further information (702-856-3339), and again ***Thank You!*** for taking the time to review the PLAN.

Sincerely,

J.W. Ashton, PE
Senior Project Engineer

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RECLAMATION & CLOSURE PLAN

FOR THE

DRUM MINE

MILLARD COUNTY, UTAH

December 1998

Prepared for
Western States Minerals Corporation

Prepared by
E.M. (Buzz) Gerick - VP Operations
James Ashton , PE - Senior Project Engineer

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TABLE OF CONTENTS

RECLAMATION & CLOSURE PLAN 3

INTRODUCTION 3
LOCATION 5
POST MINING LAND USE 5
RECLAMATION SCHEDULE 5
RECLAMATION APPROACH 8
RECLAMATION PROCEDURES 9
Regrading and Recontouring: 9
Growth Medium Replacement: 9
Revegetation and Stabilization: 10
Revegetation Success Standards: 11
DECOMMISSIONING OF FACILITIES 12
DRAINAGE AND EROSION CONTROL 12
SITE CHARACTERIZATION 13
DEMONSTRATION OF NON-DEGREDATION OF STATE WATERS 14
Approach: 14
Analytical Results: 14
Hydrologic Evaluation: 16
RECLAMATION 16
Mine Pits: 16
Waste Rock Storage: 17
Heap Leach and Processing Facility: 18
Process Ponds: 19
Mine Facilities: 20
Surface Water Diversions: 21
Roads: 21
Landfill and Sanitary Wastes: 22
Exploration: 23
RECLAMATION MONITORING 24
Surface Water Monitoring: 24
Ground Water Monitoring: 24
Erosion and Revegetation: 24

RECLAMATION COST ESTIMATE 26

INTRODUCTION 26
COST SUMMARY 28
GENERAL METHODOLOGIES AND ASSUMPTIONS 30
COST ESTIMATES 32
Manpower: 32
Equipment: 33
Material: 34
EARTHWORK/RECONTOURING 35
Volumes and Initial Calculations: 35
Slope Reduction, Dumps (Waste Rock) & Heaps (Ore Material): 36
Ripping: 37
Growth Medium Placement: 38
Spread Growth Medium: 40
Drainage Establishment Around LG3: 42
Drainage Rip-Rap: 44

Mined Pits (Perimeter berm): 45
Process Ponds: 46
Main Access Road / Borrow Area: 48
Earthwork / Recontouring Cost Estimate Summary: 49
REVEGETATION / STABILIZATION 50
Fertilization, Seed Application and Medium Sampling: 50
Bio-solid and Bio-solid Application: 50
Cost Per Acre - Revegetation / Stabilization: 51
"Pocking" Sloped Surfaces: 52
RECLAMATION MONITORING 53
Vegetation Monitoring: 53
Total cost for Reclamation Monitoring: 53
Water Monitoring (if required, not included in total cost): 54
Monitoring Wells: 54
FACILITIES REMOVAL 55
Removal of Leach Lines and Fresh Water Piping System: 55
Drill Hole and Well Abandonment: 55
Structure and Building Demolition and Removal: 57
Total cost for Facilities Removal: 57

REFERENCES 58

MAPS 59

TABLES:

TABLE #1 - Reclamation Responsibility and Areas 4
TABLE #2 - Revegetation Seed Mixture 11

FIGURES:

FIGURE #1 - Drum Mine Location Map 6
FIGURE #2 - Reclamation Schedule and Sequence 7
FIGURE #3 - Area of Responsibility 27

APPENDICES:

APPENDIX A - Characterization Sampling Program
APPENDIX B - Characterization Sampling Laboratory Results and Summary Tables
APPENDIX C - Hydrologic Evaluation Results
APPENDIX D - Settlement and Reclamation Agreement

RECLAMATION & CLOSURE PLAN

INTRODUCTION

Western States Minerals Corporation (WSMC) considers reclamation and closure to be an integral and important component of the mining sequence. The reclamation and closure plan for the Drum Mine has been prepared to comply, in concept, with the requirements of the Bureau of Land Management (BLM), the Utah Department of Natural Resources, Division of Oil, Gas and Mining (DOGM) and the Division of Water Quality (DWQ). The goals of the reclamation and closure plan are:

- Ensure public safety, reduce or eliminate adverse impacts, and to minimize unsightly visual impacts
- Minimize off-site impacts by controlling deleterious infiltration, erosion, sedimentation and related degradation of existing drainages.
- Return the disturbed areas to a stabilized condition similar to that which existed prior to mining activities.
- Re-establish a stable environment that will support a diverse self-sustaining vegetation and wildlife habitat, consistent with accepted land use objectives.
- Achieve a visual compatibility with the surrounding landscape.

The Drum Mine was a conventional gold heap leach operation, operated by WSMC from 1984 to October 1988 when it was sold to Jumbo Mining Company (E.B. King, President). Mine disturbances consisted of pits, heaps, dumps, ponds, plant site, access roads and drill holes and pads. The land package consisted entirely of unpatented mining claims on BLM ground. The major permits were a Notice of Intent filed with DOGM, and a Plan of Operations filed with the BLM. JUMBO was to have assumed all reclamation liabilities but due to a certain contractual dispute, which has been litigated for nine years, resulted in the current split reclamation responsibilities. Pursuant to a "Settlement and Reclamation Agreement" dated April 13, 1998 between WSMC and the three agencies (the "Settlement Agreement"), WSMC has agreed to perform reclamation on part of the site. This Reclamation and Closure Plan is submitted pursuant to the Settlement Agreement.

TABLE #1

Drum Mine Reclamation/Closure Responsibility and Reclaimed Area

Reclamation Responsibility	Area Description	Area Size Reclaimed (Acres)
WSMC	LG1	3.5
WSMC	LG2	17.9
WSMC	LG3	12.7
WSMC	HG6	5.0
WSMC	HG7	9.4
WSMC	W1	20.1
WSMC	W2	14.9
WSMC	W3	5.9
WSMC	W7	13.4
WSMC TOTAL	---	**102.8**

Reclamation Responsibility	Area Description	Area Size Reclaimed (Acres)
JUMBO/DOGM	HG1	11.5
JUMBO/DOGM	HG2	8.8
JUMBO/DOGM	HG3	8.1
JUMBO/DOGM	HG4&5	17.8
JUMBO/DOGM	W4	3.5
JUMBO/DOGM	SW EX PIT	19.5
JUMBO/DOGM	NR PIT	18.2
JUMBO/DOGM	POND/FACILITY	17.9
JUMBO/DOGM	OTHER	1.5
JUMBO/DOGM	**TOTAL**	**106.8**

WSMC & JUMBO	SOIL BORROW	43.9

SITE TOTAL **253.5**

LOCATION

The Drum Mine is located in Millard County, approximately 35 miles northwest of Delta, Utah. The mine facilities are in sections 7 and 8 of T15S/R10W. Situated in the Drum Hills, the site is semi-arid with mean annual rainfall of 7.79 inches. There are no perennial streams on the property, and runoff is limited to periods of snow melt and major storms. The elevation of the mine is from 5,800 to 6,300 feet with mean temperature of 50.1 degrees Fahrenheit. Please refer to Figure #1, Drum Mine Location Map.

POST MINING LAND USE

This reclamation and closure plan is designed to achieve post-mining land use consistent with those that existed prior to mining. These land uses include wildlife habitat, domestic grazing, diverse recreation, and mineral exploration and development. These objectives will be achieved by ensuring that affected areas are reclaimed to geotechnically and erosionally stable configurations capable of supporting a diverse, self-perpetuating plant community similar in appearance and function to nearby undisturbed areas.

RECLAMATION SCHEDULE

The proposed reclamation schedule is presented in Figure #2. Pursuant to the request of the parties involved, the schedule shown is one in which the entire mine is reclaimed. Though it would be possible for WSMC and JUMBO/DOGM to individually reclaim their respective areas of responsibility, the most efficient process in terms of time, money and materials would be to complete the reclamation at one time. Therefore, a consolidated reclamation approach is the premise for this report. All financial estimations, equipment requirements, time requirements and supplies are based on completing reclamation for the whole site at one time. It is anticipated that reclamation activities would commence after this plan is approved, and when weather conditions allow for efficient equipment operation. Therefore, Figure #2 assumes a commencement of activities beginning the first or second quarter of 1999, and completion prior to year end.

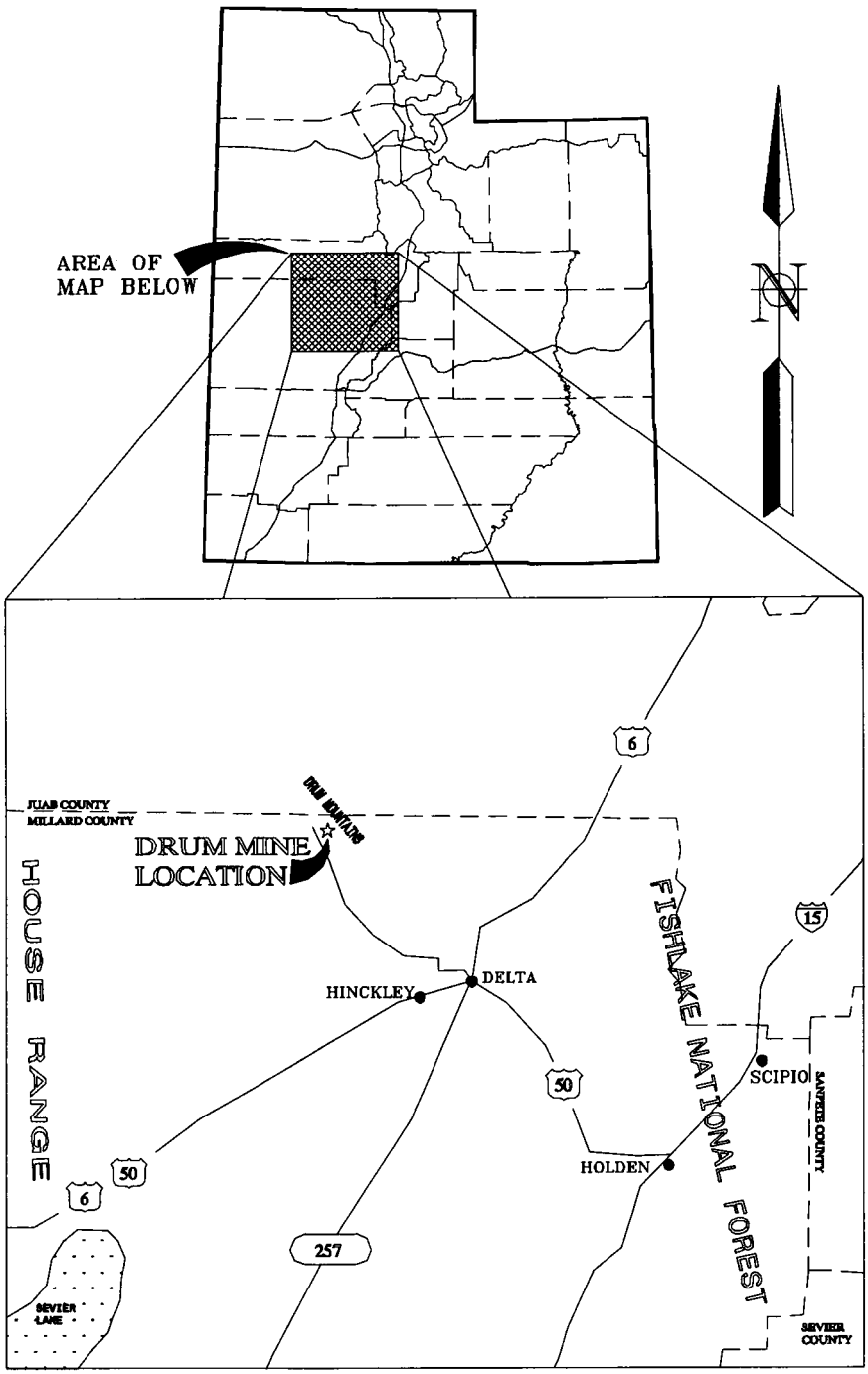

FIGURE #1
DRUM MINE LOCATION MAP

FIGURE #2
PROJECTED RECLAMATION SCHEDULE AND SEQUENCE

Task	Year of Drum Mine Reclamation			
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Recontouring, Ripping				
Removal of Facilities, Demolition				
Cover & Growth Medium Application				
Establish LG3 Drainage				
Drainage Construct & Rip-Rap Application				
Pit Perimeter Berm				
Fill Process Pond				
Grade Borrow Area				
Fertilize, Seed & Mulch				
Reclamation Monitoring *				

Note: * = Monitoring continues for a period of two years after reclamation has been completed.
Dashed lines indicate flexibility within the schedule.

The starting time is dependent on approval of the reclamation and closure plan, and thus no specific starting date has been cited. The time required for each task is based on estimates to complete earthwork and related activities by a third party contractor. For the purposes of this document, reclamation is initiated in the beginning of June, but may be initiated earlier depending on approval and weather conditions, with completion estimated sometime around the middle of November. Total time to reclaim the lands is estimated at 5.5 months.

RECLAMATION APPROACH

Disturbed areas within the project boundary, except the SW EX Pit and NR Pit, will be reclaimed by regrading, applying growth media, fertilization (possibly using manure or other bio-solids), and seeding. Soil samples of the growth medium were collected and analyzed ensuring that the correct soil amendments will be used. Prior to regrading any slopes with a grade greater than three horizontal feet to one vertical foot, all accessible soil will be removed from the toe of the slope prior to recontouring, and either applied directly on a recontoured area or stockpiled for future use. Surface drainage will be reestablished throughout the property to minimize excessive overland flow and the resultant erosion of reclaimed areas, and to eliminate the potential for ponding on the flatter surfaces. In general, all reclamation activities will be performed in accordance with the requirements of the BLM's Surface Management Regulations (e.g. as found in 43 CFR 3809) and DOGM's Mineral Regulatory Program (e.g. as found in the State of Utah Rule R647). Pursuant to Utah regulation R647-4-112, a request for variance from the open pit reclamation requirement of R647-4-111.7 will be made.

The waste dumps will be regraded to provide gentle transitions and remove sharp slope changes, thus blending into the surrounding topography. Following regrading, a layer of growth medium (soil) will be added and spread evenly across the regraded surface. Final waste dump slope angles are designed to be 3H : 1V or flatter. Some type of fertilization (preferably a bio-solid) will be added to the growth media prior to "pocking" (roughening the surface by creating small depressions in order to enhance water collection) the surface. An approved seed mixture will be applied to the prepared growth media, and a spring harrow, or other device, will be used on the flatter surfaces to lightly cover the seed.

The heap leach pads will be reclaimed in a fashion similar to that used for the waste dumps. The heaps will be regraded to a maximum 3H : 1V slope and shaped to eliminate the potential for standing water. Next, a layer of growth medium will be placed over the recontoured surface. The surface will be "pocked" and revegetated (i.e. application of bio-solids and/or fertilizer and seed). Diversion channels will be created, where needed, to convey potential run-on away from these reclaimed surfaces.

All haul roads will be reclaimed by regrading, ripping compacted surfaces, replacing growth medium and revegetating the area. Regrading will, to the extent possible, restore the areas to pre-disturbance topography. However, consultation with the BLM and DOGM will be made concerning which roads will remain and which should be reclaimed.

All ancillary facilities will be demolished and removed prior to reclamation. Concrete foundations will be broken up to the extent possible and buried onsite. Other areas will be regraded and compacted surfaces will be ripped prior to application of growth medium and revegetated.

RECLAMATION PROCEDURES

Areas for final reclamation include the mine facility sites - the waste rock dumps and two open pits; and the processing facility sites - the heap leach pads, ponds and buildings. The final site topography will resemble that shown on Map 1 (found in the attached map pocket).

Regrading and Recontouring:

Regrading and or recontouring of the mine area will commence upon approval of the reclamation and closure plan, and when weather conditions allow for efficient equipment operation. The final reclaimed slope angle for the leach pads and waste rock dumps is anticipated to be approximately 3H:1V. A bulldozer will be the primary tool used to grade the areas to the design slope. Other areas of the mine site, which do not require recontouring, will be scarified in preparation for growth medium replacement.

Growth Medium Replacement:

After regrading to achieve the post-mining contours, the remaining disturbed areas with flatter surfaces will be ripped or scarified to eliminate areas of compaction. Next, approximately six (6) inches of suitable growth medium will be placed on all disturbed areas, where it does not currently exist. In addition to the existing stockpiled growth media (topsoil), an area of approximately 44 acres will be disturbed in order to supply the total required growth medium.

Revegetation will be performed to provide erosional stability, reduce infiltration by optimizing evapotranspiration, and establish a plant community consistent with the post-mine land uses. After final regrading of the heaps and waste rock dumps, approximately six (6) inches of suitable growth medium will be placed over all disturbed areas, where it does not currently exist. Some type of bio-solids will be applied and incorporated into the upper substrate to add organic material and help increase the effective rooting depth of the new vegetation. Application of a fertilizer may be required if the bio-solids added

are not sufficient. After the soil amendments have been incorporated into the regraded surfaces; "pocking" of the surface will occur to create small micro-ecosystems.

The mine site has limited amounts of suitable growth medium available. In addition to the stockpiled growth media (topsoil), the proposed borrow areas (see Map 3, Topsoil/Growth Medium Areas) appear to contain the remaining required quantity of growth medium. The area disturbed, during the process of obtaining the growth medium, will be kept to a minimum. Every effort will be made to salvage any suitable growth medium, in the immediate vicinity, during the reclamation process. Enough growth media will be left in the borrow areas to revegetate those sites.

Seed will be applied to all surfaces, directly after the growth medium has been spread and "pocked". All seeding will be done by hand or mechanical broadcasting. On the flatter surfaces, a spring harrow or other device will be used to lightly cover the seed to help in germination.

Revegetation and Stabilization:

Some type of bio-solids will be applied to enhance the growth medium's fertility. Additional chemical fertilizer may be required if the bio-solids are inadequate.

Seedbed preparation will be completed during the spreading of the growth medium. The growth medium will be spread using a bulldozer which will break up the medium minimizing clogging and compaction. All spreading operations will be conducted so as to minimize soil erosion. "Pocking" will take place after the soil amendments have been added. The final seedbed will result in a furrow-like configuration parallel to the contour with "pock" marks or small depressions. This will minimize erosion, optimize available soil moisture, and produce a soil surface appropriate for broadcast seeding. Seedbed preparation will occur just before seeding to provide the highest probability for successful germination. The seed mixture will be composed of introduced annual and perennial plants adapted to the conditions of the area. Table #2, below, lists the seed mixture to be used.

During the post closure and reclamation period, revegetation will be monitored for herbaceous production, ground cover, and overall species diversity. Monitoring will continue for two years after reclamation activities have been completed, or less, depending on the success of meeting the revegetation criteria. If revegetation success has not been achieved within the 2 year post closure / reclamation period, the information obtained from monitoring will be used to identify alternative practical revegetation approaches to be incorporated into a revegetation program, as appropriate.

TABLE #2

Revegetation Seed Mixture

Species	Variety	PLS lb. /Acre	PLS/Square Feet
Sand DropSeed	None	1.0	125
Crested Wheatgrass	Hycrest	3.0	15
Indian Ricegrass	Paloma	3.0	12
Squirrel Tail	None	1.0	
Immigrant Kochia	Immigrant	1.0	9
Utah Vetch	None	1.0	
Winterfat	None	2.0	2
Fourwing Saltbush	Native	3.0	4
Shadscale	None	3.0	4

** PLS-Pure Live Seed

Revegetation Success Standards:

Revegetated areas will be monitored for a minimum of two years following completion of reclamation activities. Monitoring will be initiated to evaluate reclamation success relative to revegetation for the mine site as a whole. Utah's Mineral Regulatory Program R647-4-111, will be incorporated into the reclamation standards for the site along with the "Settlement and Reclamation Agreement Between and Among Western States Minerals Corporation and the United States Department of Interior, Bureau of Land Management and State of Utah, Department of Natural Resources, Division of Oil, Gas and Mining and Department of Environmental Quality, Division of Water Quality" dated March 30, 1998. This agreement is contained in Appendix D.

Vegetative sampling will be performed at the conclusion of the first two growing seasons following seeding. Sampling will include plant foliar cover measured by the line intercept method. Sampling will be randomly selected and sampling intensity will be conducted at a level to ensure that plant population is adequately represented from a statistical perspective. All cover data will be collected at the species level to determine if desirable species have been successfully established. In addition, evidence of reproduction will be collected and will include such things as seed production, vegetative propagation, and presence of sew seedling.

To determine revegetation success, the reclaimed areas will be compared to appropriate reference areas having similar characteristics to the reclaimed areas. Reference areas will be selected by the BLM, DOGM, and WSMC and will include areas with varying exposures and aspects. Reference areas will be sampled with the same methodology as described for the Revegetated areas.

Reclamation will be considered successful if total plant cover and herbaceous production are within 50 percent of the total plant cover and herbaceous production of the reference areas (within a 90 percent confidence level). After two years, reclaimed areas which do not meet the established criteria will be evaluated and a decision made with the regulatory agency as to the best course of action to meet the revegetation goal. Normally these areas, not meeting the standard, will be reseeded.

DECOMMISSIONING OF FACILITIES

During closure, all buildings and related facilities will be dismantled and disposed of appropriately. Concrete foundations will be broken up and placed either in the mine waste dumps and buried, or buried in place. Subsequent to the removal of all facilities, the site will be graded to re-establish a natural drainage pattern. The synthetic liners in the process water ponds will be freed from their anchors, and folded in on themselves and covered with fill material prior to the placement of growth media and revegetation. The solution in the process ponds will be disposed by spraying and evaporation over HG1. The sediment in the two ponds will be left in place, encapsulated within the liner, and buried.

Unless designated by the BLM for land management or recreation purposes, all roads will be closed and reclaimed during the reclamation process. The compacted roads will be ripped, graded and water-barred to permit natural drainage and revegetation. The existing fencing around the property will remain until reclamation and revegetation have been determined to be successful. This perimeter fence will be maintained and posted throughout the revegetation monitoring period.

Wells that were developed to provide project water, will be properly sealed. Water delivery pipeline(s) will be removed. These tasks will be accomplished in accordance to the appropriate regulations.

DRAINAGE AND EROSION CONTROL

The Drum Mine site is located in an ephermal drainage environment where water only flows during times of intense precipitation or during snow melt. Natural drainage patterns through the mine site will be re-established in a manner that will minimize the

potential for erosion and run-on to the reclaimed facilities. WSMC will re-establish surface water flow channels around LG3 and LG2 heap leach pads, and thereby eliminate the potential for water to pond, to the extent possible. All drainage channels will be rip-rapped where appropriate and constructed in a manner as to minimize erosion. The side slopes of the heaps and waste rock piles will be recontoured to an approximate 3H:1V slope. This will allow the growth medium placed on these slopes to be disced along contour, and thus help prevent excess erosion and moisture loss. The use of other erosion control methods, such as: the installation of silt fences, straw bales, mulch and energy dissipation boulders will be determined in the field, at the time of reclamation.

SITE CHARACTERIZATION

Active leaching of all the heaps was discontinued in October 1990. Since that time, the heaps have sat idle. No known rinsing of the heaps, with fresh water, has taken place. Therefore, only meteoric water has come in contact with the heaps and waste dumps with no apparent adverse affects. In May and June of 1998, a site characterization sampling program was undertaken by WSMC and DOGM. The goal of the characterization program was to determine the characteristics of the spent ore heaps and waste dumps at the Drum Mine site. A sampling and testing program was developed and is attached in Appendix A. Essentially, the program consisted of excavating small pits on the heaps and waste dumps and collecting samples. A total of 318 samples were collected from the heaps and 14 samples from the waste dumps. The solution and sediment in the process water ponds was also sampled. Nine (9) samples from the proposed growth medium borrow areas were also collected with assistance from DOGM. These samples were used to determine bio-solid and fertilizer application rates.

In order to thoroughly characterize the spent ore heaps and waste dumps, the following analytical procedures were performed:

- NDEP Meteoric Water Mobility Test (MWMT)
- Acid Generation/Acid Neutralization Potential
- EPA Profile II
- WAD Cyanide and Paste pH
- Permeability and Moisture Content

Laboratory testing results and summary tables are attached as Appendix B.

DEMONSTRATION OF NON-DEGREDATION OF STATE WATERS

Approach:

The following steps were undertaken to clearly demonstrate that the conditions in which the spent ore heaps and waste dumps will be closed, will not create a potential for degradation of the waters of the state (R647-4-111).

- Constituent concentrations for each method of site characterization have been compared to drinking water standards (DWS) and best engineering practices to determine if a potential exists to degrade the waters of the state.
- If constituent concentrations are less than the drinking water standards or pass the best engineering practice test, then it is deemed that no degradation of state waters will occur.
- If constituent concentrations are greater than the drinking water standards and fail to pass the best engineering practice test, a hydrologic evaluation will be conducted to determine the potential impacts of the constituents on the ground water beneath the heaps or waste dumps.

Analytical Results:

Analytical results from the site characterization sampling program are considered to be representative for the site and each heap or waste dump. These results, summarized in Tables B-1 through B-4 in Appendix B, indicate the following:

MWMT Results (only exceedances are noted):

- pH was slightly elevated for LG2-2, HG1 (both samples), HG2 (both samples), HG4&5-2, HG7 (2 of 4 samples) where the highest value was 9.03 in HG1-1.
- Arsenic exceeded the DWS in HG1-1, HG3 (both samples), HG4&5-1, and HG7 (3 of 4 samples) where the highest value was 0.19 mg/l in HG7-3.
- Iron exceeded the DWS in LG2-1, LG2-2, HG1-1, HG3 (both samples), HG4&5 (2 of 3 samples), HG6 (both samples), HG7 (2 of 4 samples). The highest value was recorded in HG6-1 at 2.1 mg/l.
- Lead exceeded the DWS in HG6-1 and HG7-1 where the highest value was 0.019 mg/l in HG6-1.
- Manganese exceeded the DWS in LG2-3 at 0.48 mg/l.
- Sulfate exceeded the DWS in LG2-3 at 400 mg/l.

- Results from the pregnant pond solids show that the DWS were exceeded for arsenic, chloride, manganese, sulfate and TDS. All concentrations were minimally over the standard
- Results from the barren pond solids show that the DWS were exceeded for pH, chloride, sulfate and TDS. The pond solids are mainly composed of lime which accounts for the high pH and TDS. The other concentrations were only minimally above the standard.

EPA Profile II Results (only exceedances are noted):

- Results from the pregnant pond solution show that the DWS were exceeded for pH, arsenic, chloride, iron, lead, sulfate and TDS. All constituents, but chloride, sulfate and TDS, only minimally exceeded the standard.
- Results from the barren pond solution show that the DWS were exceeded for pH, chloride, fluoride, iron, sulfate and TDS. Only chloride and TDS were more than three times the standard.

Acid Generation/Acid Neutralization Potential (AG/ANP) Testwork:

The following sequence of waste testing was conducted on all samples to determine the presence and extent, if any, of net acid generating potential.

- Stage 1 Testing - Total sulfur was determined by Leco furnace method and the acid NP using acid titration. Results are expressed in terms of percent Calcium Carbonate Equivalent. Samples which have NP greater than three times the AP can be considered to be nonacid generating.
- Stage 2 Testing - Determine the sulfide sulfur content of the sample. Express the results in terms of percent Calcium Carbonate Equivalent. Samples that have a neutralization capacity (determined in Stage 1) greater than three times the sulfide sulfur content can be considered to be nonacid generating.
- Stage 3 Testing - Perform humidity cell testing, or the equivalent, and collect weekly leachate samples for analysis over a period of not less than one month. Use the results of the leachate analyses as an indicator of waste leachate characteristics.

AG/ANP Results (only exceedances are noted):

- All but LG2-1 and LG2-3 passed the Stage 1 and Stage 2 testing. Due to the arid environment and low rainfall the Stage 3 testing was not done. Results from the hydrologic evaluation also show that no leachate will be produced.

Hydrologic Evaluation:

Results of the hydrologic evaluation are shown in Appendix C, Tables C-1 through C-11. Due to the arid environment and relatively low rainfall, the hydrologic evaluation predicted no measurable leachate production from the heaps under the conditions simulated.

The evaluation method used the program, Hydrologic Evaluation of Landfill Performance, HELP Model Version 3.05a (5 June 1996) (HELP3). Pertinent data used by the program includes weather data from the area, and soil and design data. The weather data (Table C-11) was obtained from station 422090 in Delta, Utah approximately twenty five miles from the mine site. The weather data used was from the period 1978 to 1987, a ten (10) year time frame with 29% higher than average precipitation, thus simulating a worst case scenario. Table B-1 contains laboratory results for the heap material parameters of saturated hydraulic conductivity, porosity and field capacity. Wilting point was calculated using the ratio of initial and final moisture percentages and the calculated field capacity. Thus the wilting point for the heap material is essentially the initial moisture content. The growth medium data made use of the default parameters for a sandy loam.

Data from each section of a particular heap was averaged to get one set of parameters for that heap. Two scenarios were simulated: The first was the recontoured heap without growth medium and the second was the recontoured heaps with six (6) inches of growth medium added. Both simulations yielded no leachate, however, the scenario with the growth medium dramatically reduced the amount of water taken up by the heap.

RECLAMATION

Mine Pits:

It has been determined that it is not economically feasible to reclaim the SW EX and NR open pits. Therefore, pursuant to R647-4-112, a request for exemption from the open pit reclamation requirements of R647-4-111-7 (Highwalls) inclusive, is being made.

At this time, backfilling all of the SW EX and NR open pits is not economically or practically feasible due to the associated costs and resulting environmental impacts. Backfilling the two pits would require the relocation of approximately 6 million cubic yards of material and would require several years to complete. Backfilling would require a significant investment in manpower, equipment, fuel and time. The extended time period required for backfilling may also contribute to continued impacts to other resources, including air quality, groundwater consumption, wildlife, and livestock grazing

and an increased consumption of non-renewable petroleum products.

Although present technologies do not provide an economically feasible method of recovering gold from low-content ores, future technologies may become available and additional mining may once again be feasible. If the pits are backfilled, future mining of the pits could not be accomplished in a cost effective manner. In addition, backfilling would remove evidence of remaining mineralization. Maintaining this evidence is allowed by the BLM's Surface Management regulations contained in 43 CFR 3809.

The open pits were designed to provide long-term stability. No post mining stabilization of the pit walls is proposed. The open pits were mined at slopes ranging from approximately 47 degrees to 30 degrees. Laying back or mechanically stabilizing the pit walls from their current configuration is not economically feasible and could create unsafe conditions.

Public motorized access to the pits will be eliminated and an earthen berm will be constructed around the open pit highwall, to discourage unsafe access. Warning signs will be posted, at intervals around the pits, to identify the potential hazard. The berm will be located so that any potential post-closure pit failure will not affect their integrity. The earthen berms and warning signs will be maintained on a yearly basis until monitoring of the site ceases.

An objective of this reclamation plan is to facilitate future mineral exploration and development in areas immediately surrounding and including this mine site. None of the reclamation activities proposed will adversely impact any future mining in the area.

Revegetation of the open pits will not be conducted except in areas of disturbance around the surface perimeter of the pit and all accessible ramps into the pits. Revegetation of these areas will be completed as described previously in the revegetation/stabilization section.

Waste Rock Storage:

The waste rock dumps occupy approximately 81.2 acres (includes LG1 heap which was never leached). These areas will be reclaimed by regrading to the final configurations shown on Map 1, Approximate Final Topography. This final reclamation configuration was developed to minimize regrading and satisfy the design criteria. The design criteria were established to; 1) ensure the stability of the reclaimed slopes, 2) minimize erosion, and 3) provide surface configurations similar to the surrounding topography and suitable for successful revegetation.

The final reclamation configuration, as shown on Map 1, Approximate Final Topography, depicts an overall slope configuration of approximately 3H:1V. Prior to recontouring, the

additional area at the toe of the waste rock disposal sites, which will be covered due to sloping, will be cleared and grubbed. Any suitable growth medium, from the clearing and grubbing activities, will be salvaged and the shrubs will be piled up at the toe creating small animal habitat.

After final regrading of the waste dumps, approximately six (6) inches of growth material will be applied. Due to the arid climate and porosity of the waste material, the growth material will allow for greater moisture retention and root penetration and reduce the amount of meteoric water entering the dumps. Following the placement of the growth material, bio-solids will be applied and incorporated into the surface of this growth material layer. Additional chemical fertilizer may be applied if the application of bio-solids is inadequate. The addition of bio-solids will increase the amount of organic material in the growth media, thereby enhancing the effective rooting depth for new vegetation. The bio-solids will also hold more moisture creating access to greater volumes of soil water for sustained growth and optimizing evapotranspiration.

Revegetation will be performed to provide erosional stability, reduce infiltration by optimizing evapotranspiration, and establish a plant community consistent with the post-mine land uses. Surface preparation, including "pocking", discing and harrowing, will occur on all surfaces prior to seeding. Sloping surfaces will be disced along contour to help prevent erosion and then "pock" marked to create micro-ecosystems there by optimizing water availability for plant growth. Surface preparation will take place in the fall of the year, immediately prior to seeding. Seed will be applied to all surfaces by hand or mechanical broadcasting.

Heap Leach and Processing Facility:

The heap leach pads occupy approximately 71.3 acres (excluding LG1 heap). The final reclamation configuration of the heap leach pads is shown on Map 1, Approximate Final Topography.

Both WSMC and DOGM believe that the existing heaps can be classified as being detoxified and neutralized according to the BLM's standards. This conclusion is based on the results of the site characterization program done by both WSMC and DOGM. Results from the site characterization program indicate that the heap leach pads and solution ponds are detoxified and can be closed as proposed herein.

All side slopes will be regraded to achieve an overall slope configuration of approximately 3H:1V. During this recontouring process, some of the heap material will be pushed off the lined containment area. The top surface of all the heaps will be shaped to eliminate the potential for standing water and minimize the potential for runoff down the side slopes.

After final regrading of the heap leach pads, approximately six (6) inches of growth material will be applied. Due to the arid climate and porosity of the ore, the growth material will allow for greater moisture retention and root penetration and reduce the amount of meteoric water entering the heap. Following the placement of the growth material, bio-solids will be applied and incorporated into the growth media layer. Additional chemical fertilizer may be applied if the application of bio-solids is inadequate. The addition of bio-solids will increase the amount of organic material in the growth media, thereby enhancing the effective rooting depth for new vegetation. The bio-solids will also hold more moisture creating access to greater volumes of soil water for sustained growth and optimizing evapotranspiration.

Revegetation will be performed to provide erosional stability, reduce infiltration by optimizing evapotranspiration, and establish a plant community consistent with the post-mine land uses. Surface preparation, including "pocking", discing and harrowing, will occur on all surfaces prior to seeding. Sloping surfaces will be disced along contour to help prevent erosion and then "pock" marked to create micro-ecosystems there by optimizing water availability for plant growth. Surface preparation will take place in the fall of the year, immediately prior to seeding. Seed will be applied to all surfaces by hand or mechanical broadcasting.

During the regrading process, diversion channels will be constructed to collect and convey potential run-on away from the reclaimed areas. The channels will be designed to contain the precipitation from the 100-year 24-hour storm event. This regrading will enhance the blending of the heap leach pad with the surrounding topography by providing a smooth transition. The establishment of a revegetated surface over the heap leach pad, in conjunction with the high evaporation rate for the area, will significantly limit the amount of potential infiltration, and thus potential outflow. Based on the limited infiltration and the stable chemical composition of the heap material, no monitoring or collection of the outflow is anticipated or expected.

Process Ponds:

All ponds will be backfilled and regraded to restore, to the extent possible, pre-mining topography, and the areas will be seeded. Impounded water and/or solutions in the process ponds or sediment pond that is present at the time of reclamation will be allowed, or induced, to evaporate or sprayed over heap HG-1. The accumulation of solids on the bottom of these ponds has been analyzed and based on the results, this material can be disposed of on site, encapsulated in the pond liner. Any hazardous materials found will be disposed of off site at an appropriate disposal facility in accordance with all applicable state and federal regulations for handling and disposal. Non-hazardous waste will be left in place. The pond liners will be folded and covered in place to a minimum depth of 5 feet below the final reclamation surface. Pond areas will then be backfilled and the surface graded to establish a reclaimed surface configuration approximately as shown on

Map #1, Approximate Final Topography. The final reclaimed surface configuration is designed to promote runoff away from the pond areas.

After final regrading of the process pond area, approximately six (6) inches of growth material will be applied. The growth material will allow for greater moisture retention and root penetration. Following the placement of the growth material, bio-solids will be applied and incorporated into the growth media layer. Additional chemical fertilizer may be applied if the application of bio-solids is inadequate. The addition of bio-solids will increase the amount of organic material in the growth media, thereby enhancing the effective rooting depth for new vegetation. The bio-solids will also hold more moisture creating access to greater volumes of soil water for sustained growth and optimizing evapotranspiration.

Revegetation will be performed to provide erosional stability, reduce infiltration by optimizing evapotranspiration, and establish a plant community consistent with the post-mine land uses. Surface preparation, including "pocking", discing and harrowing, will occur on all surfaces prior to seeding. All surfaces will be disced along contour to help prevent erosion there by optimizing water availability for plant growth. Surface preparation will take place in the fall of the year, immediately prior to seeding. Seed will be applied to all surfaces by hand or mechanical broadcasting.

The final reclamation configuration of the pond areas will be incorporated into the re-established drainage there by directing surface run-off away from these facilities.

Mine Facilities:

During the reclamation process all ancillary buildings and structures will be dismantled for disposal. Any remaining reagents will be returned to suppliers or properly disposed of off site. Nonsalvageable items that are relatively inert, such as HDPE liner, concrete, and scrap building material and equipment will be buried on-site or disposed of off-site in compliance with state of Utah regulations. Equipment and building materials that have been in contact with cyanide or other toxic chemicals will be decontaminated prior to sale or disposal. Materials buried on site or removed to an off-site landfill, will be disposed of in accordance with both state and federal regulations.

Concrete foundations, walls, and sumps will be broken up where possible and buried to a minimum depth of five feet as to not interfere with plant growth. Disturbed areas will be graded to blend with the natural topography and seeded. No visible structures will remain. Material contaminated with hazardous waste (if any) will be disposed of off-site at an approved landfill for hazardous materials, and will follow appropriate state and federal regulations.

After final regrading of the facilities, approximately six (6) inches of growth material will

be applied. The growth material will allow for greater moisture retention and root penetration. Following the placement of the growth material, bio-solids will be applied and incorporated into the growth media layer. Additional chemical fertilizer may be applied if the application of bio-solids is inadequate. The addition of bio-solids will increase the amount of organic material in the growth media, thereby enhancing the effective rooting depth for new vegetation. The bio-solids will also hold more moisture creating access to greater volumes of soil water for sustained growth and optimizing evapotranspiration.

Revegetation will be performed to provide erosional stability, reduce infiltration by optimizing evapotranspiration, and establish a plant community consistent with the post-mine land uses. Surface preparation, including "pocking", discing and harrowing, will occur on all surfaces prior to seeding. All surfaces will be disced along contour to help prevent erosion and optimize water availability for plant growth. Surface preparation will take place in the fall of the year, immediately prior to seeding. Seed will be applied to all surfaces by hand or mechanical broadcasting.

All access roads will be reclaimed to the mine boundary, unless the BLM requires that some remain accessible. Therefore, future access for monitoring purposes will be by foot, or with the use of a small ATV.

Surface Water Diversions:

The diversion channels shown on Map 1, Approximate Final Topography, will be constructed to divert potential up gradient run-on and to direct runoff from reclaimed process facilities. Each channel will be constructed to contain precipitation from a 100-year, 24-hour storm event and to convey the flow away from the reclaimed surfaces, where possible, and into natural drainage channels.

Where possible, the diversion channels will follow natural contours at a slope of approximately 1.0%. Energy dissipation will be provided at channel outlets to reduce flow velocities and prevent surface erosion. Diversion channels will be constructed using appropriately sized rip-rap and energy dissipation boulders to minimize surface erosion, where necessary.

Roads:

The Drum Mine area has approximately 2.2 acres of access roads, and 1.5 acres of additional roads not included as part of previously discussed reclaimed areas. All roads within the project boundary will be reclaimed during the reclamation process. Most of the roads are reclaimed as part of the reclamation activities associated with the waste rock

dumps and heap leach pads. Within the project boundary, the primary access road will be removed during the reclamation process as this road lies within the proposed growth media borrow area.

Reclamation will include regrading and recontouring these areas to blend with the surrounding topography and revegetation. Regrading will, to the extent possible, restore the area to pre-disturbance topography. The majority of haul roads provide access from the open pits to the heaps and waste rock disposal areas. These haul roads, not discussed previously in the reclamation of heaps and waste rock dumps, will be reclaimed as stated below. Any culverts will be removed during reclamation and the natural drainage will be re-established.

After final regrading, approximately six (6) inches of growth media will be placed over this surface. The growth material will allow for greater moisture retention and root penetration. Following the placement of the growth material, bio-solids will be applied and incorporated into the growth media layer. Additional chemical fertilizer may be applied if the application of bio-solids is inadequate. The addition of bio-solids will increase the amount of organic material in the growth media, thereby enhancing the effective rooting depth for new vegetation. The bio-solids will also hold more moisture creating access to greater volumes of soil water for sustained growth and optimizing evapotranspiration.

Revegetation will be performed to provide erosional stability, reduce infiltration by optimizing evapotranspiration, and establish a plant community consistent with the post-mine land uses. Surface preparation, including "pocking", discing and harrowing, will occur on all surfaces prior to seeding. All surfaces will be disced along contour to help prevent erosion and optimize water availability for plant growth. Surface preparation will take place in the fall of the year, immediately prior to seeding. Seed will be applied to all surfaces by hand or mechanical broadcasting.

Landfill and Sanitary Wastes:

The permitted landfill site is located on the east side of waste rock disposal site W1. The landfill will be reclaimed concurrently with W1. Special care will be taken so as to not disturb the landfill. The landfill will be covered with a minimum of five feet of material prior to application of the growth medium, fertilizer and seed.

The septic system will be disconnected and piping will be sealed. This site will be reclaimed in a similar fashion as that described for the mine facilities.

Exploration:

Any open drill holes within the project boundary, plus the fresh water well will be plugged pursuant to R647-4-108, inclusive. Holes which encountered water will be closed as per R647-4-108-2.12.112, filling from the bottom up (through the drill stem) with a high grade bentonite/water slurry mixture. Other wells, monitoring or observation wells, will also be plugged according to the requirements of R647-4-108 once they are no longer required for compliance or post closure monitoring purposes.

WSMC shall also reclaim the disturbance around Busby Spring, an unplugged drill hole above Busby Spring and disturbances caused by exploration activities conducted under notices UT-057-39N, UT-056-64N, UT-056-062N, and unserialized notice submitted December 13, 1983 and unserialized notice submitted February 1, 1985.

RECLAMATION MONITORING

Environmental monitoring of the project area will consist of post-reclamation monitoring. Post-reclamation monitoring will continue for a period of two years, at which time an evaluation of site reclamation will be made. Reclamation would be considered successful when the disturbed sites are stabilized (to the extent reasonable), and the revegetation goals have been met. Post-reclamation monitoring will then cease and the remaining reclamation bond will be released by the BLM and DOGM.

Surface Water Monitoring:

The surface water drainage will be inspected twice a year by a qualified person for a period of two years. The inspection will make note of any excessive erosion and condition of any sediment control facilities. If excess erosion is found or erosion control structures are in need of maintenance, they will be repaired as soon as practical during the two year post-reclamation monitoring period.

Ground Water Monitoring:

Based upon the results of the characterization data and the site conditions, no ground water monitoring is proposed.

Erosion and Revegetation:

Revegetated areas will be monitored for a minimum of two years following completion of reclamation activities. Monitoring will be initiated to evaluate reclamation success relative to revegetation for the mine site as a whole. BLM Instruction Memorandum No. NV-94-026, November 19, 1993, will be incorporated into the reclamation standards for the site.

Vegetation sampling will be performed at the completion of two growing seasons following seeding. Sampling will include plant foliar cover measured by the line intercept method. Sampling locations will be randomly selected and sampling intensity will be conducted at a level to ensure that plant population is adequately represented from a statistical perspective. All cover data will be collected at the species level to determine if desirable species have been successfully established. In addition, evidence of reproduction will be collected and will include such things as seed production, vegetative propagation, and presence of sew seedling.

To determine revegetation success, the reclaimed areas will be compared to appropriate reference areas having similar characteristics to the reclaimed areas. Reference areas will be selected by the BLM, DOGM, and WSMC and will include areas with varying exposures and aspects. Reference areas will be sampled with the same methodology as described for the Revegetated areas.

Reclamation will be considered successful if total plant cover and herbaceous production are within 50 percent of the total plant cover and herbaceous production of the reference areas (within a 90 percent confidence level). After two years, reclaimed areas which do not meet the established criteria will be evaluated and a decision made with the regulatory agency as to the best course of action to meet the revegetation goal. Normally these areas, not meeting the standard, will be reseeded.

RECLAMATION COST ESTIMATE

INTRODUCTION

The reclamation responsibility for the Drum Mine as currently agreed to by the BLM and DOGM is to be jointly split between Western States Minerals Corporation (WSMC) and Jumbo Mining Company (JUMBO). Currently DOGM is conducting reclamation work under bond forfeiture by JUMBO. The following table lists the areas of reclamation responsibility between the two entities. Figure #3 and Map #2 show the areas for which each operator is responsible.

Reclamation Responsibility	Area Description	Area Size (Acres)
WSMC	LG1	3.5
WSMC	LG2	17.9
WSMC	LG3	12.7
WSMC	HG6	5.0
WSMC	HG7	9.4
WSMC	W1	20.1
WSMC	W2	14.9
WSMC	W3	5.9
WSMC	W7	13.4
WSMC TOTAL	---	**102.8**
DOGM/JUMBO	HG1	11.5
DOGM/JUMBO	HG2	8.8
DOGM/JUMBO	HG3	8.1
DOGM/JUMBO	HG4&5	17.8
DOGM/JUMBO	W4	3.5
DOGM/JUMBO	SW EX PIT	19.5
DOGM/JUMBO	NR PIT	18.2
DOGM/JUMBO	POND/FACILITY	17.9
DOGM/JUMBO	OTHER	1.5
JUMBO TOTAL	---	**106.8**
WSMC & JUMBO	SOIL BORROW	43.9
	SITE TOTAL	**253.5**

WSMC currently maintains a reclamation performance bond in the amount of $264,080 and JUMBO maintains a reclamation performance bond in the amount of $143,000 for the Drum Mine. The amount of these bonds is based on prior estimated costs associated with reclaiming the areas affected by existing mining activities.

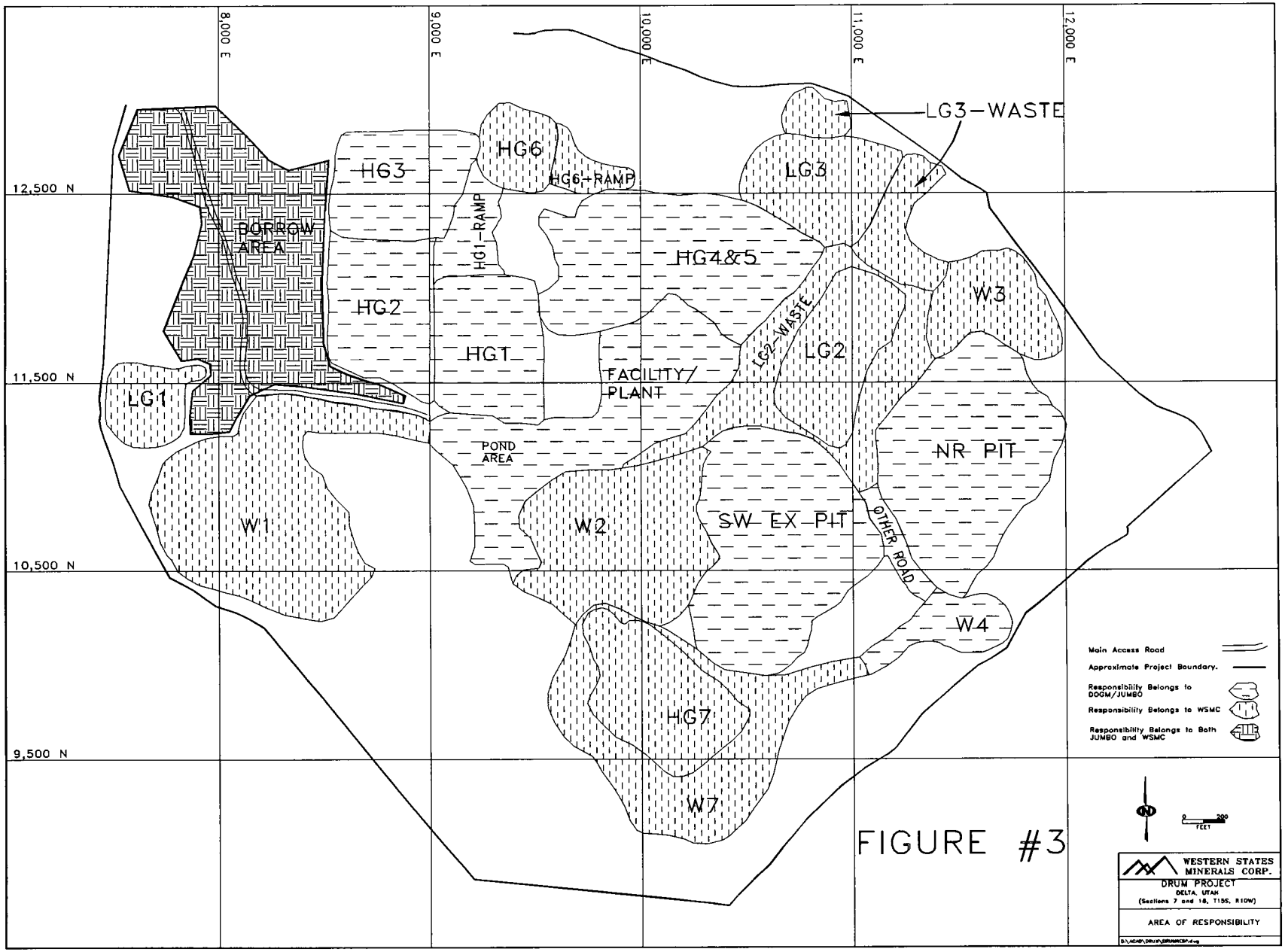
8,000 E
9,000 E
10,000 E
11,000 E
12,000 E
12,500 N
11,500 N
10,500 N
9,500 N
LG3-WASTE
HG6
HG3
HG6-RAMP
LG3
HG1-RAMP
BORROW AREA
HG4&5
HG2
W3
LG2-WASTE
HG1
LG2
FACILITY/ PLANT
LG1
POND AREA
NR PIT
W1
W2
SW EX PIT
OTHER ROAD
W4
HG7
W7
Main Access Road
Approximate Project Boundary.
Responsibility Belongs to DOGM/JUMBO
Responsibility Belongs to WSMC
Responsibility Belongs to Both JUMBO and WSMC
0
200
FEET
WESTERN STATES MINERALS CORP.
DRUM PROJECT
DELTA, UTAH
(Sections 7 and 18, T13S, R10W)
AREA OF RESPONSIBILITY

FIGURE #3

The purpose of this **Reclamation Cost Estimate** is to develop a realistic cost appraisal for an independent contractor to complete site reclamation. The cost estimate presented in this section is based on the planned final reclamation procedures presented in the preceding portion, **Reclamation Plan**, of this document.

COST SUMMARY

The following table is a summary of the costs associated with reclamation of the Drum Mine site. The following reclamation cost estimate reflects the estimated cost to reclaim 253.5 acres. Costs include overhead and profit associated with an independent contractor's work.

WSMC COST ESTIMATION SUMMARY TABLE

Reclamation Responsibility	Area Description	Earthwork / Recontouring	Revegetate Stabilization	Reclamation Activities (Other)
WSMC	LG1	$2,996	$1,973	-
WSMC	LG2	$23,632	$5,319	-
WSMC	LG3	$124,189	$5,207	-
WSMC	HG6	$5,032	$2,168	-
WSMC	HG7	$12,810	$5,481	-
WSMC	W1	$33,376	$11,916	-
WSMC	W2	$22,416	$8,153	-
WSMC	W3	$11,022	$3,280	-
WSMC	W7	$23,058	$8,019	-
WSMC	HG6-RAMP	$2,727	$935	-
WSMC	LG2-WASTE	$18,687	$5,608	-
WSMC	LG3-WASTE	$10,361	$2,668	-
WSMC	BORROW	$4,764	$9,870	-
WSMC	MONITORING	-	-	$2,893
WSMC	MOB - DEMOB	-	-	$10,000
WSMC	SUPERVISION	-	-	$19,915
WSMC	FINAL REPORT	-	-	$869
WSMC TOTAL	---	**$295,070**	**$70,597**	**$33,677**
Engineering & Contingency (10%) =		**$39,934**		

Total WSMC cost for Drum Mine reclamation: = **$439,278**

JUMBO COST ESTIMATION SUMMARY TABLE

Reclamation Responsibility	Area Description	Earthwork / Recontouring	Revegetate Stabilization	Reclamation Activities (Other)
DOGM/JUMBO	HG1	$9,949	$4,978	-
DOGM/JUMBO	HG2	$7,222	$4,641	-
DOGM/JUMBO	HG3	$8,989	$4,725	-
DOGM/JUMBO	HG4&5	$28,312	$10,397	-
DOGM/JUMBO	HG1-RAMP	$2,728	$1,446	-
DOGM/JUMBO	W4	$5,528	$1,716	-
DOGM/JUMBO	SW EX PIT	$8,846	$2,203	-
DOGM/JUMBO	NR PIT	$8,571	$1,844	-
DOGM/JUMBO	POND/FACIL	$77,956	$8,049	-
DOGM/JUMBO	OTHER ROADS	$3,001	$674	-
DOGM/JUMBO	BORROW	$4,764	$9,870	-
DOGM/JUMBO	MONITORING	-	-	$2,893
DOGM/JUMBO	REMOVE FACILITY	-	-	$49,720
DOGM/JUMBO	MOB - DEMOB	-	-	$10,000
DOGM/JUMBO	SUPERVISION	-	-	$19,915
DOGM/JUMBO	FINAL REPORT	-	-	$869
DOGM/JUMBO	**TOTAL**	**$165,866**	**$50,543**	**$83,397**
Engineering & Contingency (10%)=		**$29,981**		

Total DOGM/JUMBO cost for Drum Mine reclamation: **= $329,787**

TOTAL DRUM MINE RECLAMATION: **= $769,065**

GENERAL METHODOLOGIES AND ASSUMPTIONS

In completing the reclamation calculations necessary to estimate total reclamation costs for the Drum Mine, the following details were employed:

- The maximum disturbance configuration as shown on Map 2, Current Topography, in conjunction with Map 1, Approximate Final Topography, were used to calculated areas, volumes and costs. Map 2, Current Topography, was developed by Olympus Aerial Survey from photographs taken July 22, 1987. Since the time of that survey, no additional significant disturbance has taken place.

- Equipment requirements were determined using the calculated reclamation areas and volumes, and productivity estimates developed using standard methods presented in the Caterpillar Performance Handbook, Edition 28.

- Equipment, labor and other costs have been calculated using published references where available. The Mine and Mill Equipment Costs: An Estimator's Guide, (MEC) published by Western Mine Engineering, Inc., "Caterpillar Performance Handbook, Edition 28", published by Caterpillar Inc., and the General Wage Determinations Issued Under the Davis-Bacon and Related Acts as described in General Decision Number UT980001, 11, 14, 16 were the primary cost references. Also used was the Mining Cost Service book published by Western Mine Engineering, Inc. for cost of materials. Seed costs are as of September, 1998 provided by Great Basin Agriculture of Elko, Nevada. The objective in developing specific cost data has been to identify unit costs which are representative of those which would be incurred for final reclamation, given site conditions and prevailing economics for contract earthwork. Unit costs were adjusted as appropriate to reflect regional economic factors and project scheduling.

- Required reclamation functions were identified based on the nature and extent of disturbance included in this document as part of the Reclamation Plan.

- Effective drainage will be reestablished during final reclamation. Drainage reestablishment will involve grading to develop a suitable channel, slope reduction, construction of transitional slopes to tie into the existing natural drainage and use of rip-rap where appropriate.

- Growth medium volumes were determined using disturbed area acreage and replacement depth of six (6) inches over all disturbed areas. Haul distances were measured from Map 3, Material Destination Map, which shows the soil borrow area and each disturbed area.

- Equipment productivity's for each specific function were determined using standard references and representative grades and haulage distances. All productivity calculations for various equipment units are included in the individual cost detail calculations.

- Based on sampling results of the heap and waste dump material and the hydrologic evaluation, no detoxification of the heaps will be necessary.

COST ESTIMATES

Manpower:

The manpower costs have been calculated on rates published by the General Wage Determinations Issued Under the Davis-Bacon Act. The rates reflect the prevailing wage for the given job. FICA @ 15.5 percent and SIIS @ 10.52 percent have been added to all job descriptions, as well as Fringe/Benefit @ 32 percent, as individual line items to calculate a total hourly wage rate for each manpower category.

Loader Operator (Caterpillar 988 loader, 8 cu yd)

- Base wage = $17.44/hr.
- FICA/SIIS = $ 4.54/hr.
- Fringe/Benefits = $ 5.58/hr.

Total Wage = $27.56/hr.

Driller (Rotary rig for well abandonment)

- Base wage = $16.80/hr.
- FICA/SIIS = $ 4.37/hr.
- Fringe/Benefits = $ 5.38/hr.

Total Wage = $26.55/hr.

Equipment Operator (Dozer - Caterpillar D9, Scraper - Caterpillar 631E, 21 cu yd)

- Base wage = $17.44/hr.
- FICA/SIIS = $ 4.54/hr.
- Fringe/Benefits = $ 5.58/hr.

Total Wage = $27.56/hr.

Equipment Operator, small (Tractor, Backhoe, Flatbed Truck)

- Base wage = $12.80/hr.
- FICA/SIIS = $ 3.33/hr.
- Fringe/Benefits = $ 4.10/hr.

Total Wage = $20.23/hr.

Truck Driver (Caterpillar 769, 35 ton)

- Base wage = $15.25/hr.
- FICA/SIIS = $ 3.97/hr.
- Fringe/Benefits = $ 4.88/hr.

Total Wage = $24.10/hr.

Laborer (General)

- Base wage = $10.82/hr.
- FICA/SIIS = $ 2.82/hr.
- Fringe/Benefits = $ 3.46/hr.

Total Wage = $17.10/hr.

Construction Manager

- Base wage = $26.26/hr.
- FICA/SIIS = $ 6.83/hr.
- Fringe/Benefits = $ 8.40/hr.

Total Wage = $41.49/hr.

Project Engineer (Contracts, Final report)

- Base wage = $27.50/hr.
- FICA/SIIS = $ 7.16/hr.
- Fringe/Benefits = $ 8.80/hr.

Total Wage = $43.46/hr.

Equipment:

The following equipment has been estimated for use in reclamation at the Drum Mine. Total hourly equipment costs have been obtained from the "Caterpillar Performance Handbook, Edition 28" , as published by Caterpillar Inc.

Equipment	Total Hourly Cost
Caterpillar 623 F Series II Scraper	= $110.00
Caterpillar 988B Front End Loader	= $109.00
Caterpillar 773D Haul Truck	= $ 80.00
Caterpillar D9N-U Bulldozer	= $107.00
Caterpillar 325 Series II Backhoe	= $ 51.00
One Ton Flatbed Truck	= $ 19.00
3 / 4 Ton Pickup Truck	= $ 17.00
Manure Spreader - Truck (Supplier Quote)	= $ 50.00
Water Well Drill	= $100.00

Material:

As part of the reclamation work, it can be expected that various materials will be used. Material will include seed and fertilizer, manure, bagged concrete and bentonite. The costs for materials are included as part of each section and not itemized here. Unless otherwise noted, material and supply prices were obtained from the "Mine Cost Service" (1997) published by Western Mine Engineers, Inc.

EARTHWORK/RECONTOURING

Volumes and Initial Calculations:

Volumes of material were calculated using Map 2, Current Topography, and Map 4, Original Topography. The total volume of ore, including both high grade and low grade, is calculated at 2,286,000 cubic yards. The total volume of waste rock removed is calculated to be 3,878,000 cubic yards. The following table outlines material volumes for each area:

AREA	MEASURED VOL(CU YD)	TOE AREA (SQ FT)	TOE LENGTH (FT)	CREST (SQ FT)	CREST LENGTH (FT)	CALC AVE HEIGHT (FT)
HG1	180,727	280,649	2,101	152,095	1,538	23
HG2	138,040	316,705	2,418	233,718	2,000	14
HG3	194,964	271,942	2,102	131,530	1,410	27
HG4&5	665,563	541,212	3,527	320,200	2,903	42
HG6	87,207	95,987	1,183	39,608	763	36
HG7	268,529	351,813	2,902	207,826	1,916	26
LG1	44,534	126,944	1,533	80,539	1,080	12
LG2	414,740	297,545	2,479	102,856	1,704	58
LG3	291,591	232,045	1,875	111,791	1,411	47
TOTAL ORE	2,285,895					

W1	804,756	675,332	4,175	482,078	2,478	60
W2	582,924	365,451	2,745	242,432	1,515	45
W3	212,788	213,387	2,052	121,301	1,216	20
W4	39,435	148,464	2,415	76,698	350	10
W7	1,165,981	75,588	3,671	460,622	1,912	55
HG1-RAMP	6,320	68,961	1,118	26,079	880	10
HG6-RAMP	16,114	58,995	1,258	19,978	491	20
LG2-WASTE	945,358	915,960	4,426	684,958	1,322	35
LG3-WASTE	104,622	228,119	2,704	73,542	522	30
TOT WASTE	3,878,298					

Slope Reduction, Dumps (Waste Rock) & Heaps (Ore Material):

Assumptions:

- Work by Caterpillar D9N with a Universal Blade
- Dozer correction factors
  - Poor Operator = 0.60
  - Job efficiency = 0.67
  - Material = 1.20
  - Slot Dozing = 1.20
  - Grade (-30%) = 1.60
  - Material Weight = 0.77

- Final slope 3H : 1V or less
- Total cost includes manpower and equipment costs, no material costs incurred.

AREA	CREST LENGTH (FT)	AVERAGE HEIGHT (FT)	AVE PUSH DISTANCE (FT)	AVE D9N PRODUCTION (LCY/HR)	CORRECTED D9N PROD (LCY/HR)	AREA TO MOVE (SQ FT)	VOLUME TO MOVE (LCY)	ESTIMATED TIME (HRS)	ESTIMATED COST ($)
HG1	1,538	23	32	1,800	1,278	151	8,601	7	$942
HG2	2,000	14	20	1,800	1,278	47	3,481	3	$404
HG3	1,410	27	38	1,800	1,278	208	10,862	9	$1,211
HG4&5	2,903	42	59	1,750	1,242	504	54,189	44	$5,920
HG6	763	36	50	1,800	1,278	370	10,456	9	$1,211
HG7	1,916	26	36	1,800	1,278	193	13,696	11	$1,480
LG1	1,080	12	17	1,800	1,278	41	1,640	2	$269
LG2	1,704	58	81	1,400	994	961	60,650	62	$8,342
LG3	1,411	47	66	1,700	1,207	631	32,976	28	$3,768
W1	2,478	60	84	1,400	994	1,029	94,439	96	$12,918
W2	1,515	45	63	1,700	1,207	579	32,488	27	$3,633
W3	1,216	20	28	1,800	1,278	114	5,134	5	$673
W4	350	10	14	1,800	1,278	29	376	1	$135
W7	1,912	55	77	1,500	1,065	864	61,184	58	$7,804
HG1-RAMP	880	10	14	1,800	1,278	29	945	1	$135
HG6-RAMP	491	20	28	1,800	1,278	114	2,073	2	$269
LG2-WASTE	1,322	35	49	1,800	1,278	350	17,137	14	$1,884
LG3-WASTE	522	30	42	1,800	1,278	257	4,969	4	$538
TOTAL								383	$51,536

Ripping:

Assumptions:

- All compacted surfaces will be ripped prior to growth medium material replacement.
- Ripping depth will be 18 inches.
- Ripping will be completed using a Caterpillar D9N-U dozer with a single shank ripper.
- Seismic velocity is estimated at 4000 feet per second for production calculations.
- Average uncorrected production is 1,800 bank cubic yards per hour (Cat Handbook - ripper production graphs).
- Job Efficiency is 83%.
- Average corrected production is 1,494 BCY/hr.

Production time in hours per acre:

- (18 in) x (1 ft/12 in) x (43,560 sq. ft/acre) x (1 cu yd/27 cu ft) = 2,420 BCY/acre
- 1,494 BCY/hr / 2,420 BCY/acre = 0.62 acre/hr

Cost per acre:

- Manpower - (1 hr/0.62 acre) x ($27.56/hr) = $44.45/acre
- Equipment - (1 hr/0.62 acre) x ($107.00/hr) = $172.58/acre
- Materials - none needed

Cost Estimate Summary - Ripping

AREA	ACREAGE	COST ($)
W1	9.4	$2,040.08
W2	5.4	$1,171.96
W3	3.0	$ 651.09
W4	2.2	$ 477.47
W7	5.1	$1,106.85
LG3-RAMP	1.2	$ 260.44
SW EX PIT	4.9	$1,063.45
NR PIT	4.1	$ 889.82
POND/FACILITY	17.9	$3,884.84
OTHER - ROADS	2.5	$ 542.58
TOTALS	**55.7**	**$12,088.58**

Growth Medium Placement:

Assumptions:

- Average depth of growth medium is six (6) inches.
- Growth Medium will be obtained from the borrow area and stockpiles located around the site (See Map 5, Topsoil/Growth Media Areas).
- The haulage distances and grades were determined from Map 3, Material Destination Map.
- Job efficiency at 67% - 40 minutes worked per hour.
- Altitude is 6100 feet MSL - Derate = 96%.

Equipment requirements:

- Varies - 623 F Series II Scrapers (Caterpillar)
- 2 - D9N-U Dozers (Caterpillar)

Equipment productivity's:

Scraper Load Time = 0.55 min
Scraper Maneuver and Spread Time = 0.85 min
(cycle time in table includes load time and maneuver and spread time)
Estimated Payload = scraper capacity (23 LCY) x load factor (.80) = 18.4 LCY
Pusher (Dozer) cycle time = 140% of load time (0.77 min) + 0.25 min = 1.02 min

Scraper Cycle Time Calculation Summary

AREA	ACREAGE	VOLUME (LCY)	DISTANCE TO BORROW (FT)	HAUL RESIST (%)	RETURN RESIST (%)	HAUL TIME (MIN)	RETURN TIME (MIN)	CYCLE TIME (MIN)
HG1	8.6	6,940	2,998	6	2	2.8	1.2	5.6
HG2	8.8	7,120	2,085	5	3	1.6	0.9	4.1
HG3	8.1	6,520	2,258	8	0	2.7	0.8	5.1
HG4&5	17.8	14,380	4,564	6	2	4.0	1.8	7.4
HG6	3.3	2,700	3,539	7	1	3.6	1.3	6.5
HG7	9.4	7,600	3,574	6	2	3.2	1.4	6.2
LG1	3.5	2,860	931	3	5	0.7	0.6	2.9
LG2	7.9	6,360	4,874	8	0	5.5	1.7	8.8
LG3	7.4	5,980	5,125	7	1	5.4	1.8	8.8
W1	20.1	16,240	2,526	6	2	2.3	1.0	4.9
W2	14.9	12,000	3,173	7	1	3.3	1.3	6.2
W3	5.9	4,780	4,910	8	0	5.6	1.8	9.0
W4	3.5	2,830	4,440	6	2	3.8	1.7	7.1
W7	13.4	10,800	3,749	5	3	2.8	1.6	6.0
HG1-RAMP	2.9	2,340	2,310	6	2	2.1	1.0	4.7
HG6-RAMP	1.7	1,390	3,100	7	1	3.2	1.2	6.0
LG2-WASTE	10	8,060	4,991	8	0	5.7	1.8	9.1
LG3-WASTE	5.3	4,250	4,744	8	0	5.5	1.8	8.9
SW EX PIT ROAD	4.9	3,940	4,089	2	6	1.7	2.3	5.6
NR PIT ROAD	4.1	3,280	5,416	2	6	2.4	3.0	7.0
POND/FACILITIES	17.9	4,810	500	-2	10	0.3	0.5	2.4
OTHER - ROADS	1.5	1,220	3,888	5	3	2.0	1.6	5.2

Estimate total hourly cost:

Based on a weighted average for all areas, the number of scrapers needed is 6.

623 F Scrapers	@ $110.00/hr x 6 units =	$ 660.00/hr
D9N-U Dozer	@ $107.00/hr x 2 units =	$ 214.00/hr
Manpower	@ $ 27.56/hr x 8 persons =	$ 220.48/hr
Total		**$1,094.48/hr**

Production and Cost Estimate Summary - Growth Medium

AREA	VOLUME (LCY)	CYCLE TIME (MIN)	CYCLES PER HOUR	SCRAPER PRODUCT (LCY/HR)	ADJUSTED PRODUCT (LCY/HR)	NUMBER OF SCRAPERS (#)	FLEET PRODUCT (LCY/HR)	TIME TO FINISH (HR)	EST COST ($)
HG1	6,940	5.6	10	248	166	6	996	7	$7,661
HG2	7,120	4.1	14	347	233	6	1398	5	$5,472
HG3	6,520	5.1	11	273	183	6	1098	6	$6,567
HG4&5	14,380	7.4	8	198	133	6	798	18	$19,701
HG6	2,700	6.5	9	223	150	6	900	3	$3,283
HG7	7,600	6.2	9	223	150	6	900	9	$9,850
LG1	2,860	2.9	20	496	332	6	1992	2	$2,189
LG2	6,360	8.8	6	149	100	6	600	11	$12,039
LG3	5,980	8.8	6	149	100	6	600	10	$10,945
W1	16,240	4.9	12	298	199	6	1194	14	$15,323
W2	12,000	6.2	9	223	150	6	900	14	$15,323
W3	4,780	9.0	6	149	100	6	600	8	$8,756
W4	2,830	7.1	8	198	133	6	798	4	$4,378
W7	10,800	6.0	10	248	166	6	996	11	$12,039
HG1-RAMP	2,340	4.7	12	298	199	6	1194	2	$2,189
HG6-RAMP	1,390	6.0	10	248	166	6	996	2	$2,189
LG2-WASTE	8,060	9.1	6	149	100	6	600	14	$15,323
LG3-WASTE	4,250	8.9	6	149	100	6	600	8	$8,756
SW EX PIT ROAD	3,940	5.6	10	248	166	6	996	4	$4,378
NR PIT ROAD	3,280	7.0	8	198	133	6	798	5	$5,472
POND/FACILITIES	4,810	2.4	25	620	415	6	2490	2	$2,189
OTHER - ROADS	1,220	5.2	11	273	183	6	1098	2	$2,189
TOTALS	136,400							161	$176,211

Spread Growth Medium:

Assumptions:

- Work by Caterpillar D9N with a Universal Blade
- Dozer correction factors
  - Average Operator = 0.75
  - Job efficiency = 0.83
  - Material = 1.20
  - Grade (-10%) = 1.20
  - Material Weight = 0.89 (2400 lb./cu ft / 2700 lb./cu ft)
- Average push distance = 150 ft.
- Uncorrected Production = 900 LCY/hr
- Total cost includes manpower and equipment costs, no material costs incurred.

Dozer productivity (corrected):

(900 LCY/hr) x (0.75) x (0.83) x (1.2) x (1.2) x (.89) = 718 LCY/hr

Dozer Spreading Cost:

D9N-U Dozer ($107.00/hr) + Manpower ($27.56/hr) = $134.56/hr

Cost Estimate Summary - Spreading Growth Medium

AREA	VOLUME GROWTH MEDIUM (LCY)	SPREAD GROWTH MEDIUM (HOUR)	COST GROWTH MEDIUM ($)
HG1	6,940	10	$1,346
HG2	7,120	10	$1,346
HG3	6,520	9	$1,211
HG4&5	14,380	20	$2,691
HG6	2,700	4	$538
HG7	7,600	11	$1,480
LG1	2,860	4	$538
LG2	6,360	9	$1,211
LG3	5,980	8	$1,076
W1	16,240	23	$3,095
W2	12,000	17	$2,288
W3	4,780	7	$942
W4	2,830	4	$538
W7	10,800	15	$2,018
HG1-RAMP	2,340	3	$404
HG6-RAMP	1,390	2	$269
LG2-WASTE	8,060	11	$1,480
LG3-WASTE	4,250	6	$807
SW EX PIT ROAD	3,940	5	$673
NR PIT ROAD	3,280	5	$673
POND/FACILITIES	4,810	7	$942
OTHER - ROADS	1,220	2	$269
TOTALS	136,400	192	$25,835

Drainage Establishment Around LG3:

Assumptions:

- Material weight estimated at 2970 lb./loose cu yd.
- Average one way haul distance is 800 feet.
- Material will be removed from the North side of LG3 and placed on the South side prior to sloping LG3.
- Volume of material to be moved is calculated to be 79,943 cubic yards.
- Job efficiency is average at 83%.
- Equipment to be used:
  - Loader: Caterpillar 988B (7 cu yd heaped capacity)
  - Trucks: Caterpillar 773D (50 ton capacity)
  - Dozer: D9N-U

Equipment productivity:

- Loader: Caterpillar 988B front end loader (Caterpillar Handbook)

Loader cycle time:

Basic cycle time (min):	0.60
Material Factor (6 in and over):	+0.04
Pile Factor (dumped by truck):	+0.02
Total cycle time (min):	0.66

Loader cycles per hour:

$$\frac{60 \text{ minutes/hr}}{0.66 \text{ minutes/cycle}} \times 0.83 \text{ (job efficiency)} = 75 \text{ cycle/hr}$$

Loader productivity:

75 cycle/hr x 7 loose cu yd/cycle x 0.85 fill factor = 446 cu yd/hr

Passes per truck:

$$\frac{50 \text{ tons/truck} \times 2{,}000 \text{ pounds/ton}}{(7 \times 0.85) \text{ loose cu yd/pass} \times 2970 \text{ pounds/loose cu yd}} = 5.65 \text{ passes}$$

Therefore, the Caterpillar 988 loader and the Caterpillar 773 truck combination is feasible.

- Trucks: Caterpillar 773D (Caterpillar Handbook)

Truck cycle time:

Load time: 6 passes @ 0.66 minutes/pass	= 3.96 minutes
Haul time: 1,600 feet @ 10 mile per hour	= 1.82 minutes
Maneuver and dump time	= 1.10 minutes
Spot time at the loader	= 0.60 minutes
Total cycle time	= 7.48 minutes

Truck cycles per hour:

$$\frac{\text{60 minutes/hr}}{\text{7.48 minutes/cycle}} \times 0.83 \text{ (job efficiency)} = 6.65 \text{ cycles per hour}$$

Truck productivity:

$$\frac{\text{50 tons/cycle} \times \text{2000 pounds/ton} \times \text{6 cycles/hr}}{\text{2,970 lb./loose cu yd}} = 202 \text{ cu yd/hr}$$

Truck requirements:

$$\frac{\text{446 cu yd/loader hr productivity}}{\text{202 cu yd/truck hr productivity}} = 2.2 \text{ trucks}$$

Assume 3 trucks are required.

- Dozer: Caterpillar D9N-U (Caterpillar Handbook)

Dozer will be require the entire time the loader and trucks are moving the material. The dozer will be pushing material to the loader and pushing material over the side of LG3 after the trucks dump.

- Required Equipment Hours:

$$\frac{\text{79,943 cu yd. total material}}{\text{446 cu yd/hr loader productivity}} = \text{179 hr.}$$

- Estimated cost for establishing drainage around LG3:

Caterpillar 988B loader @ $109.00/hr x 1 loader	= $ 109.00
Caterpillar 773D truck @ $80.00/hr x 3 trucks	= $ 240.00
Caterpillar D9N-U dozer @ $107.00/hr x 1 dozer	= $ 107.00
Loader operator @ $27.56/hr x 1 operator	= $ 27.56
Truck driver @ $24.10/hr x 3 operators	= $ 72.30
Dozer operator @ $27.56 x 1 operator	= $ 27.56
Total cost per hour	= $ 583.42/hr

Total Estimated Cost = 179 hr. x $583.42/hr = $104,440

Drainage Rip-Rap:

The drainages to be rip-rapped are shown on Map 1, Approximate Final Topography. These areas have been chosen to be rip-rapped based on their gradient, location and potential to erode.

Assumptions:

- 4,105 feet of reconstructed "drainages" to be rip-rapped.
- Average width of drainages is 15 feet.
- Average depth of rip-rap is 1 foot.
- Volume of rip-rap:

$$\frac{(4105 \text{ ft}) \times (15 \text{ ft}) \times (1 \text{ ft})}{27 \text{ cu yd/cu ft}} = 2{,}280 \text{ cu yd.}$$

- Equipment requirements and costs are the same as for re-establishment of drainage around LG3. Productivity is half that calculated to re-establish the drainage around LG3.

Cost Estimation:

Estimated cost per hour = $583.42

Drainages:

Section I: Re-establish drainage around LG3	= 1,139 cu yd.
Section II: South side of LG3	= 375 cu yd.
Section III: Drainage around LG2	= 777 cu yd.

Total Cost:

Section I: $\frac{1{,}139 \text{ cu yd.}}{223 \text{ cu yd/hr}} \times \$583.42/\text{hr} = \$2{,}980$

Section II: $\frac{375 \text{ cu yd.}}{223 \text{ cu yd/hr}} \times \$583.42/\text{hr} = \$\ 980$

Section III: $\frac{777 \text{ cu yd.}}{223 \text{ cu yd/hr}} \times \$583.42/\text{hr} = \$2{,}040$

Total Cost: = $6,000

Mined Pits (Perimeter berm):

Assumptions:

- Caterpillar D9N-U will perform work.
- Average push distance is 35 feet.
- Uncorrected productivity is 1500 LCY/hr
- Perimeter of SW EX pit is 3,726 feet.
- Perimeter of NR pit is 3,528 feet.
- Material weight estimated at 2500 pounds/cu yd.
- Dozer will be able to build perimeter berm using only that material near the perimeter of the pit.
- Warning signs will be posted every 200 feet.
- Install two (2) signs per hour.
- Height of perimeter berm is approximately 5 to 8 feet.

Dozer production correction factors:

Operator:	0.75 (Average)
Material:	0.80 (Hard to drift)
Job efficiency:	0.67 (40 min/hr)
Grade:	1.00 (0%)
Weight correction:	0.92 (2300/2500)

Dozer corrected productivity:

(1500 LCY/hr) x (0.75) x (0.80) x (0.67) x (1.0) x (0.92) = 555 LCY/hr

Volume of 1 ft of berm:

$$\frac{\text{(8 ft height) x (8 ft bottom) x (.5)}}{\text{(1 ft length)}} = 32 \text{ sq. ft/ft} = 1.19 \text{ LCY/ft}$$

Required equipment hours:

$$\frac{\text{(1.19 LCY/ft) x (7254 perimeter ft)}}{\text{(555 LCY/hr)}} = 16 \text{ hr}$$

Perimeter berm cost:

Caterpillar D9N-U (16 hr) x ($107.00/hr)	= $1,712
Dozer Operator (16 hr) x ($27.56/hr)	= $ 441
Total cost:	= $2,153

Posting of warning signs:

Number of signs to post = 40
Total time is (40 signs) x (0.5 hr.) = 20 hr.
T-post cost $3.50 each
Sign cost $2.50 each

Labor: (20 hr.) x ($17.10/hr)	= $342
Flatbed truck: (20 hr.) x ($19.00/hr)	= $380
Materials: (40) x ($6.00)	= $240
Total cost:	= $962

Total cost for pit perimeter closure: = $3,115

Process Ponds:

Assumptions:

- Fill process ponds to approximate original topography.
- Total fill required is calculated at 65,985 cu yd.
- Fill to be obtained from waste rock disposal area W2.
- Average round trip haul distance of 700 feet.
- Equipment to be used:
  - Loader: Caterpillar 988B (7 cu yd heaped capacity).
  - Trucks: Caterpillar 773D (50 ton capacity).
  - Dozer: Caterpillar D9N-U
- Material weight estimated at 2,970 lb. / LCY
- Job efficiency is 83% (Average).
- Total cost includes cost to fold liner.
- Minimum fill over folded liner equals 5 feet.

Equipment productivity:

- Loader: Caterpillar 988B front end loader (Caterpillar Handbook)

Loader cycle time:

Basic cycle time (min):	0.60
Material Factor (6 in and over):	+0.04
Pile Factor (dumped by truck):	+0.02
Total cycle time:	0.66

Loader cycles per hour:

$$\frac{60 \text{ minutes/hr}}{0.66 \text{ minutes/cycle}} \times 0.83 \text{ (job efficiency)} = 75 \text{ cycle/hr}$$

Loader productivity:

75 cycle/hr x 7 loose cu yd/cycle x 0.85 fill factor = 446 cu yd/hr

Passes per truck:

$$\frac{\text{50 tons/truck x 2,000 pounds/ton}}{\text{(7 x 0.85) loose cu yd/pass x 2970 pounds/loose cu yd}} = 5.65 \text{ passes}$$

Therefore, the Caterpillar 988 loader and the Caterpillar 773 truck combination is feasible.

- Trucks: Caterpillar 773D (Caterpillar Handbook)

Truck cycle time:

Load time: 6 passes @ 0.66 minutes/pass	= 3.96 minutes
Haul time: 700 feet @ 10 mile per hour	= 0.80 minutes
Maneuver and dump time	= 1.10 minutes
Spot time at the loader	= 0.60 minutes
Total cycle time	= 6.46 minutes

Truck cycles per hour:

$$\frac{\text{60 minutes/hr}}{\text{6.46 minutes/cycle}} \text{ x 0.83 (job efficiency)} = 7.7 \text{ cycles per hour}$$

Truck productivity:

$$\frac{\text{50 tons/cycle x 2000 pounds/ton x 7.7 cycles/hr}}{\text{2,970 lb./loose cu yd}} = 259 \text{ cu yd/hr}$$

Truck requirements:

$$\frac{\text{446 cu yd/loader hr productivity}}{\text{259 cu yd/truck hr productivity}} = 1.72 \text{ trucks}$$

Assume 2 trucks are required.

- Dozer: Caterpillar D9N-U (Caterpillar Handbook)

Dozer will be required the entire time the loader and trucks are moving the material. The dozer will be pushing material to the loader and spreading the material over the process ponds.

- Required Equipment Hours:

$$\frac{\text{65,985 cu yd. total material}}{\text{446 cu yd/hr loader productivity}} = 148 \text{ hr.}$$

- Estimated cost for reclaiming process ponds:

Caterpillar 988B loader @ $109.00/hr x 1 loader	= $ 109.00
Caterpillar 773D truck @ $80.00/hr x 2 trucks	= $ 160.00
Caterpillar D9N-U dozer @ $107.00/hr x 1 dozer	= $ 107.00
Loader operator @ $27.56/hr x 1 operator	= $ 27.56
Truck driver @ $24.10/hr x 2 operators	= $ 48.20
Dozer operator @ $27.56 x 1 operator	= $ 27.56
Total cost per hour	= $ 479.32/hr
Total Estimated Cost = 148 hr. x $479.32/hr	= **$70,940**

Main Access Road / Borrow Area:

The borrow area for growth medium encompasses the main access road completely. Thus, during the placement of growth medium over the disturbed areas of the mine site, the main access road will be eliminated and reclaimed.

Assumptions:

- All compacted surfaces will be ripped prior to fertilizing and seeding.
- No growth medium will need to be placed over borrow area after ripping.
- Ripping depth will be 18 inches.
- Ripping will be completed using a Caterpillar D9N-U dozer with a single shank ripper.
- Seismic velocity is estimated at 4000 feet per second for production calculations.
- Average uncorrected production is 1,800 bank cubic yards per hour (Cat Handbook - ripper production graphs).
- Job Efficiency is 83%.
- Average corrected production is 1,494 BCY/hr.

Production time in hours per acre:

- (18 in) x (1 ft/12 in) x (43,560 sq. ft/acre) x (1 cu yd/27 cu ft) = 2,420 BCY/acre
- 1,494 BCY/hr / 2,420 BCY/acre = 0.62 acre/hr

Cost per acre:

- Manpower - (1 hr/0.62 acre) x ($27.56/hr) = $44.45/acre
- Equipment - (1 hr/0.62 acre) x ($107.00/hr) = $172.58/acre
- Materials - none needed

Cost Estimate Summary - Borrow Area

AREA	ACREAGE	COST ($)
Borrow	43.9	$9,527.62

Earthwork / Recontouring Cost Estimate Summary:

A cost estimate summary for the earthwork and recontouring phase for the Drum Mine site is presented in the following table. Costs include manpower, equipment and material costs.

COST SUMMARY - EARTHWORK / RECONTOURING

AREA	SLOPE REDUCTION	RIPPING	PLACE GROWTH MEDIUM	SPREAD GROWTH MEDIUM	ESTABLISH DRAINAGE LG3	RIP-RAP DRAINAGE	PIT CLOSURE	FILL PROCESS PONDS	TOTAL
HG1	$942	0	$7,661	$1,346	0	0	0	0	$9,949
HG2	$404	0	$5,472	$1,346	0	0	0	0	$7,222
HG3	$1,211	0	$6,567	$1,211	0	0	0	0	$8,989
HG4&5	$5,920	0	$19,701	$2,691	0	0	0	0	$28,312
HG6	$1,211	0	$3,283	$538	0	0	0	0	$5,032
HG7	$1,480	0	$9,850	$1,480	0	0	0	0	$12,810
LG1	$269	0	$2,189	$538	0	0	0	0	$2,996
LG2	$8,342	0	$12,039	$1,211	0	$2,040	0	0	$23,632
LG3	$3,768	0	$10,945	$1,076	$104,440	$3,960	0	0	$124,189
W1	$12,918	$2,040	$15,323	$3,095	0	0	0	0	$33,376
W2	$3,633	$1,172	$15,323	$2,288	0	0	0	0	$22,416
W3	$673	$651	$8,756	$942	0	0	0	0	$11,022
W4	$135	$477	$4,378	$538	0	0	0	0	$5,528
W7	$7,804	$1,107	$12,039	$2,108	0	0	0	0	$23,058
HG1-RAMP	$135	0	$2,189	$404	0	0	0	0	$2,728
HG6-RAMP	$269	0	$2,189	$269	0	0	0	0	$2,727
LG2-WASTE	$1,884	0	$15,323	$1,480	0	0	0	0	$18,687
LG3-WASTE	$538	$260	$8,756	$807	0	0	0	0	$10,361
SW EX PIT	0	$1,063	$4,378	$673	0	0	$2,732	0	$8,846
NR PIT	0	$890	$5,472	$673	0	0	$2,536	0	$9,571
POND/FACIL	0	$3,885	$2,189	$942	0	0	0	$70,940	$77,956
OTHER ROADS	0	$543	$2,189	$269	0	0	0	0	$3,001
BORROW	0	$9,528	0	0	0	0	0	0	$9,528
TOTAL	$51,536	$21,616	$176,211	$25,925	$104,440	$6,000	$5,268	$70,940	$461,936

REVEGETATION / STABILIZATION

Fertilization, Seed Application and Medium Sampling:

Assumptions:

- Soil sampling costs were allocated in the site characterization program.
- Application rate of fertilizer is 150 lb./acre.
- Application of seed and fertilizer is by broadcasting.
- Seed bed preparation was completed during the spreading of the growth medium.
- Seed and Fertilizer application cost equals $400.00 per acre.
- Average production rate for seeding and fertilizing is 10 acres/hr.

Bio-solid and Bio-solid Application:

Assumptions:

- Use 2 ton/acre of manure at $4/ton, includes loading truck.
- Manure will be applied by use of a spreader truck.
- Average production for manure application is 50 min/acre.

Cost per Acre:

- Application
  ($50.00/hr Spreader Truck) x (50 min/acre) = $41.66/acre

- Materials
  (2 tons/acre manure) x ($4/ton) = $8.0/acre

Cost Per Acre - Revegetation / Stabilization:

Total cost per Acre:

($400.00/ac seed/fertilize) + ($49.66/ac manure) = $449.66/acre

Cost Summary - Revegetation / Stabilization

AREA	ACREAGE	COST ($)
HG1	8.6	$3,867
HG2	8.8	$3,957
HG3	8.1	$3,642
HG4&5	17.8	$8,004
HG6	3.3	$1,484
HG7	9.4	$4,227
LG1	3.5	$1,574
LG2	7.9	$3,552
LG3	7.4	$3,327
W1	20.1	$9,038
W2	14.9	$6,700
W3	5.9	$2,653
W4	3.5	$1,574
W7	13.4	$6,025
HG1-RAMP	2.9	$1,304
HG6-RAMP	1.7	$764
LG2-WASTE	10	$4,497
LG3-WASTE	5.3	$2,383
SW EX PIT ROAD	4.9	$2,203
NR PIT ROAD	4.1	$1,844
POND/FACILITIES	17.9	$8,049
OTHER - ROADS	1.5	$674
BORROW	43.9	$19,740
TOTAL	224.8	$101,082

"Pocking" Sloped Surfaces:

Assumptions:

- Equipment used will be a Cat 325 Series II excavator at $51.00 per hour.
- Operator will cost $20.23/hr.
- Production is estimated at 0.25 acres per hour.

AREA	SLOPE ACREAGE	COST ($)
HG1	3.9	$1,111
HG2	2.4	$684
HG3	3.8	$1,083
HG4&5	8.4	$2,393
HG6	2.4	$684
HG7	4.4	$1,254
LG1	1.4	$399
LG2	6.2	$1,767
LG3	6.6	$1,880
W1	10.1	$2,878
W2	5.1	$1,453
W3	2.2	$627
W4	0.5	$142
W7	7.0	$1,994
HG1-RAMP	0.5	$142
HG6-RAMP	0.6	$171
LG2-WASTE	3.9	$1,111
LG3-WASTE	1.0	$285
TOTAL	70.4	$20,058

RECLAMATION MONITORING

Vegetation Monitoring:

Assumptions:

- One inspection at the end of 2 years from completion of reclamation.
- 2 person crew of vegetation specialists from Salt Lake City, Utah consulting firm.
  - Reclamation (vegetation) specialist @ $85/hr
  - Reclamation technician @ $55/hr
- 3 day field visit for 2-persons
- 2 days for reclamation specialist to write report.
- 1 day of word processor time @ $30/hr.
- Pickup truck @ $0.35/mile
- Approximately 330 mile round trip, Salt Lake City to Drum Mine site.
- Approximately 70 mile round trip, Delta to Drum Mine site.
- 2 nights @ Delta Motel

Manpower:

Reclamation Specialist:	
1 x ($85/hr) x (5 days) x (8 hr/day)	= $3,400
Reclamation Technician:	
1 x ($55/hr) x (3 days) x (8 hr/day)	= $1,320
Word Processor:	
1 x ($30/hr) x (1 day) x (8 hr/day)	= $ 240
Total	= $4,960

Equipment /Travel:

Pickup Truck:	
1 x (470 miles) x ($0.35/mile)	= $ 165
Motel:	
1 x (2 people) x (2 nights) x ($50/night)	= $ 200
Meals:	
1 x (2 people) x (3 days) x ($35/day)	= $ 210
Total:	= $ 575

Materials:

Assume $250/yr in supplies, postage, telephone	
1 x ($250/yr)	= $ 250

Total cost for Reclamation Monitoring:

Total Cost:	=**$5,785**

Water Monitoring (if required, not included in total cost):

Assumptions:

- Semi-annual Water sampling from 4 groundwater wells for 2 years.
- 1 person to visit the site for 2 days travel and 1 day to sample water.
- Pickup truck @ $0.35/mile.
- 1012 mile round trip, Reno to Delta, Utah.
- 70 mile round trip, Delta to Drum Mine site.
- 1 NDEP profile II sample @ $355/sample.
- Sampler @ $30/hr.

Manpower:

(2 yr.) x (2/yr) x ($30/hr) x (3 days) x (8 hr/day) = $ 2,880

Equipment/Travel:

(2 yr.) x (2/yr) x (1082 miles) x ($0.35/mile)	= $ 1,515
Meals @ (2 yr.) x (2/yr) x (3 days) x ($35/day)	= $ 423
Motel @ (2 yr.) x (2/yr) x (2 nights) x (1 person) x ($50/night)	= $ 400
Total:	= $ 2,338

Materials:

(2 yr.) x (2/yr) x (4 samples) x ($355/sample) = $ 5,680

Monitoring Wells:

Assumptions:

- Construct 4 new groundwater monitoring wells:
- Average depth of wells is 150 feet.
- Cost to construct well is $21.50/ft (MEANS 026-704-0100)

Construct and Install Wells:

(4 wells) x (150 ft/well) x ($21.50/ft) = $12,900

Equipment:

(4 pumps and accessories) x ($2,500/pump) = $10,000

Total Cost: =**$ 33,798**

FACILITIES REMOVAL

Removal of Leach Lines and Fresh Water Piping System:

Assumptions:

- Use 1 ton flatbed truck @ $19.00/hr.
- Assume 500 ft/hr of leach lines can be removed by 2 laborers.
- Laborers to pick up lines and haul for disposal in landfill.
- Approximately 25,000 feet of leach lines.
- Assume 150 ft/hr of fresh water line can be removed by 2 laborers.
- Approximately 37,000 feet of 4 inch steel water line.
- Assume water line will be sold.

Removal Time:

Leach lines: $\frac{25{,}000 \text{ ft}}{500 \text{ ft/hr}} = 50 \text{ hours}$

Water line: $\frac{37{,}000 \text{ ft}}{150 \text{ ft/hr}} = 247 \text{ hours}$

Manpower Cost:

(297 hours) x (2 laborers) x ($17.10/hr) = $10,160

Equipment Cost:

(297 hours) x ($19.00/hr) = $ 5,650

Drill Hole and Well Abandonment:

Reclamation costs consider the abandonment costs for the fresh water well, the 4 monitor wells and an estimated number of open exploration drill holes. Abandonment of wells will conform to the requirements of R647-4-108. Wells will only be closed when no longer needed.

Fresh Water Well:

Assumptions:

- Casing size for well is 10 inches.
- Only one aquifer is present.
- Place a 50 foot cement plug above aquifer.
- Place a cement cap of 50 feet at collar of well.
- Estimated time to pull and plug the well is 8 hours.
- Volume of cement needed is 2 cubic yards.
- Manpower requirements are 1 driller and 2 laborers.

Abandonment Costs:

Manpower:

(8 hr/day) x [($27.56/hr driller) + (2) x ($17.10/hr labor)] = $ 495

Equipment:

(8 hr/day) x ($100/hr drill) = $ 800

Materials:

Cement (dry) @ 2,400 lb./cu yd, bagged cement (75 lb. bags)

64 bags x $4.00/bag = $ 256

Total Cost: = $1,551

Monitor Wells:

Assumptions:

- 4 monitor wells
- Casing size for each well is 4 inches
- Wells are average 150 feet deep
- Wells completely cemented upon abandonment
- Volume of cement needed is 2 cubic yards
- Estimated time to abandon each well is 4 hours
- 2 laborers per well

Abandonment Costs:

Manpower:

(4 wells) x (2 laborers) x (4hr/well) x ($17.10/hr) = $ 548

Equipment:

(4 wells) x (4 hr/well) x ($19.00/hr flatbed truck) = $ 304

Materials:

Cement (dry) @ 2,400 lb./cu yd, bagged cement (75 lb. bags)

64 bags x $4.00/bag = $ 256

Total Cost: = $1,108

Exploration Drill Holes:

Assumptions:

- The cost to plug any open drill holes per R647-4-108 is = $1,250

Structure and Building Demolition and Removal:

Assumptions:

- Demolition includes the disposal and removal of all buildings, tanks, debris and all else which is not needed for reclamation purposes or security.
- Removal implies the proper disposal of all demolition articles to an approved disposal site.
- Demolition and Removal is a Lump Sum Cost and is estimated at
  = $30,000.
- Estimated time to complete is 2 weeks

Total cost for Facilities Removal:

Total cost: = **$49,720**

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MAPS

Map 1	**Approximate Final Topography**
Map 2	**Current Topography**
Map 3	**Material Destination Map**
Map 4	**Original Topography**
Map 5	**Topsoil/Growth Media Areas**

APPENDIX A

Characterization Sampling Program

CHARACTERIZATION SAMPLING PROGRAM

FOR

HEAP LEACH PADS AND WASTE ROCK DUMPS

Located at the

DRUM MINE
MILLARD COUNTY, UTAH

November 1997

Prepared for
Western States Minerals Corporation

Prepared by
E.M. (Buzz) Gerick - VP Operations
James Ashton , PE - Project Engineer

SCOPE OF WORK:

This program proposes sampling and testing methodologies for representatively characterizing spent heap leach ore and waste rock at the Drum Mine located in sections 7 and 18, T15S, R10W and approximately 35 miles northwest of Delta, Utah in Millard County. To date, there is no regulatory or statistically accepted rule-of-thumb for what is considered ***representative*** sampling of mine waste components. Attempts have been made to formulate sampling criteria, but many site specific factors complicate such formulation including: 1) Lithologic, geochemical and climatic variability; 2) Required test method(s) and intent; 3) Waste component volume, tonnage and physical characteristics.

Once a representative sampling methodology is accepted and samples collected, the characterization results will be evaluated/interpreted and utilized to prepare a final permanent closure plan pertinent to those specific components located at the Drum Mine. Within this program is described the proposed methodology for sampling four (4) inactive spent heap leach pads, one (1) heap leach pad (e.g., LG1) which was never leached and two (2) inactive waste rock dumps; plus an inactive waste dump (designated W7) that one of the inactive spent heap leach pads (designated HG7) is built upon. The proposed laboratory testing of the collected samples relevant to their current status regarding stabilization is also outlined. Map 1 shows the locations of the five heaps and three waste dumps that Western States Minerals Corporation (WSMC) proposes to sample and characterize. Also shown on Map 1 are the proposed sample locations for each component.

The intent of this program is to collect representative samples from which the analytical results will provide characterization and analytical information necessary for the preparation of the following:

(1) Formal closure and final reclamation of these waste components;
(2) Current status of component stabilization;
(3) What additional or alternative stabilization efforts may be considered, if any; and
(4) Future monitoring needs that may be required to demonstrate that ground and surface water(s) will not be degraded.

INTRODUCTION:

The Drum Mine, a conventional open pit and heap leach facility, ceased mining operations in 1985 while leaching continued for some time thereafter. Mine waste components generated at the site during mining activity include three low-grade (LG1 through LG3) and seven high-grade (HG1 through HG7) heap leach pads and four waste rock dumps (W1 - W4), in addition to two open pits and ancillary facilities (e.g., offices, maintenance and process facilities and process ponds). Of the waste components, WSMC has agreed to evaluate and characterize spent ore on four (4) heap leach pads (LG2, LG3, HG6, HG7), three (3) waste rock dumps (W2, W3, and the dump designated W7, located underneath HG7) and a low grade ore stockpile on the heap leach pad LG1, in preparation for final closure and reclamation. Based on visual inspection of the waste components, pit walls and mining records, WSMC believes it is reasonable to assume lithologic and geochemical homogeneity within a given heap or waste rock dump.

It is not clear whether heap rinsing/detox activity(s) occurred following cessation of active leaching. However, it is known that the Department of Water Quality ordered cessation of active leaching in 1990. During the discovery inspection that WSMC representatives made of the site on Sept. 16, 1997; no solution was observed on any of the heaps or liner systems that are designated as WSMC's responsibility. In fact, most of the drainage pipes were disconnected. We suspect that heap drain-down solution is uncommon and typically flows in response to major storm events only. Consequently, heap solution(s) are not likely to be available for collection and analysis. Normally, if heap drain-down solution was available, a sample could be taken and an analysis performed. Then, results of the analysis could be interpreted and a prediction made of what constituents and/or contaminants (i.e., Profile II), if any, might be mobilized from

the spent ore. Since no solution is currently flowing from the heaps, an alternative approach to characterize these facilities is herein proposed.

PROPOSED HEAP ORE SAMPLING:

General: Each heap will be divided up into sections (number of sections depends on heap surface area). Within each section, three (3) sample locations will be marked. The three locations will be determined in a manner as to generate a representative sample for that section. Sample collection will be performed to minimize the introduction of air and/or water which could potentially degrade residual cyanide concentrations, if present. Sampling of the spent ore will be done using an excavator with a maximum reach of 25 feet. WSMC believes this is sufficient to characterize the material which will be pushed off the liner during the subsequent reduction of the slopes to reclamation grades. A cross sectional comparison between the current heap configuration and the proposed final heap configuration (e.g., Figure 1 showing sections A-A' through D-D') show that the deepest cut into the heaps during contouring is 22 feet. Map 2 is an engineered estimate of the final site topography, for those components assessed to WSMC, after reclamation contouring. Figures 1 consists of four (4) cross sections through the heaps showing the original, current and final topographies. Samples (approximately 25 lbs / 5-gal bucket) will be collected in 5 ft. increments from the excavator bucket using a hand shovel. All samples will be carefully sealed, labeled and temporarily stored in a cool, dry location. The samples will then be transported to a selected Nevada certified laboratory for analysis along with appropriate chain of custody form(s).

Individual samples will be opened by laboratory personnel and thoroughly blended by hand; the samples should not be dried beyond their existing moisture content thereby minimizing any cyanide degradation. Individual samples will be cut and quartered. Three of the quartered samples from each five foot interval will be combined to form three (3) representative composite samples for each trench. The fourth quarter sample will be saved for possible future use. Two of the three composited trench samples will then be composited with the other trenches from the same section to form two representative composite samples for each section. For instance: 1) the heap LG3 will be divided into three sections; 2) using a track mounted excavator to collect samples, three test pits will be excavated in each section and samples will be collected on five (5) foot intervals to a depth of twenty-five (25) feet; 3) The samples will be collected using a hand shovel and placed in a five gallon bucket. The bucket will be sealed, labeled and appropriately stored and then transported to a qualified laboratory; 4) Laboratory personnel will blend and quarter each five (5) foot sample. Three of the quartered samples will then be combined with other five (5) foot samples from a particular trench to create three (3) discrete composite samples per trench. The fourth individual five foot sample will be saved for possible future use. Two of the three (3) composited trench samples will be combined with the other trench samples from that particular section to form two (2) representative samples for each section for analysis by distinct test methods as described hereafter. Map 1 shows the proposed sample locations and heap division lines. Low grade heap number 1 (LG1) will be considered as a waste rock dump, for purposes of sampling and analysis, since no leaching occurred on this component.

PROPOSED WASTE ROCK SAMPLING:

W2, W3, W7 and LG1: Waste rock dumps will also be sampled using an excavator. Based on observations in the field and examination of the pit wall rock, it will be assumed that the waste rock dumps are lithologically and geochemically homogeneous throughout. If during the sampling process this assumption is determined to be invalid then the sampling procedure will be adjusted to take this variability into account. Each excavated test pit will be sampled every five foot in depth. The samples from the entire column will be placed into a single five gallon bucket (approximately 25 pounds). This sample will be considered representative for that particular test pit. Samples will be carefully sealed and labeled, and transported to the selected laboratory. There, laboratory personnel will blend, cut and quarter the samples from each waste rock dump. The resulting composite samples for each waste rock dump will be analyzed by the distinct test method as described below. Map 1 shows the proposed sample locations for the waste

rock dumps. High grade heap number seven (HG7) was built on a waste rock dump. This waste rock dump has been designated as W7 for sampling purposes. WSMC assumes that this waste component will be closed and reclaimed along with HG7.

TESTING METHODS:

General: Spent heap leach ore samples should be analyzed for WAD cyanide and paste pH, Profile II constituents (MWMP - Nevada protocol and SPLP EPA Method 1312) and for their acid generating capability(s) (AGP - ANP). Studies have shown, if material(s) pass the MWMP they are expected to pass the SPLP test.

MWMP: Meteoric Water Mobility Procedure is a test method to determine the capability of specific constituents (NDEP Profile II) to be mobilized from spent ore by "meteoric events". This is a laboratory procedure and not a field simulation so the results cannot be expressly extrapolated to be representative of the internal geochemical dynamics of a given heap. However, it gives a reasonable correlation of what can be expected to occur in the field.

SPLP: The Synthetic Precipitation Leaching Procedure is an Environmental Protection Agency (EPA) test method to determine the mobility of both organic and inorganic analytes present in samples of soils, wastes and wastewaters by "meteoric events".

AGP - ANP: (Acid Generating Potential - Acid Neutralization Potential) This test method incorporates the acid-base accounting of mineral sulfur and carbonate content relevant to acidification / neutralization capability of waste rock.

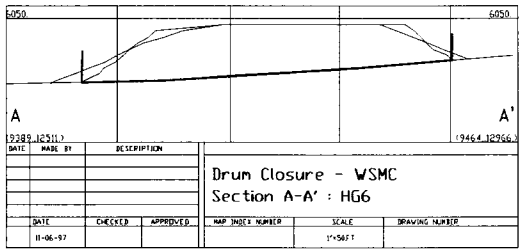
Permeability / Moisture Content of Spent Heap Ore: Samples will be evaluated relevant to the insitu moisture content and permeability of spent ore. This information is needed to determine the type, if any, of engineered infiltration cover which might be necessary for upper heap surfaces. If the spent ore has the potential to mobilize contaminants, they will have to be contained. Preliminary test results indicate that this is not expected to be a problem. The residual moisture held within the heaps will need to be quantified in order to determine the potential flow from the heaps due to predicted meteoric events.

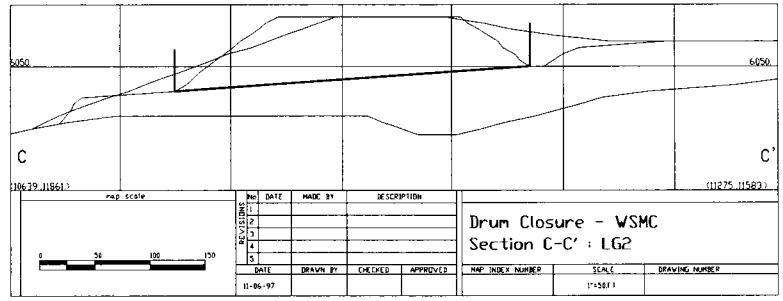
PROPOSED NATIVE SOIL SAMPLING:

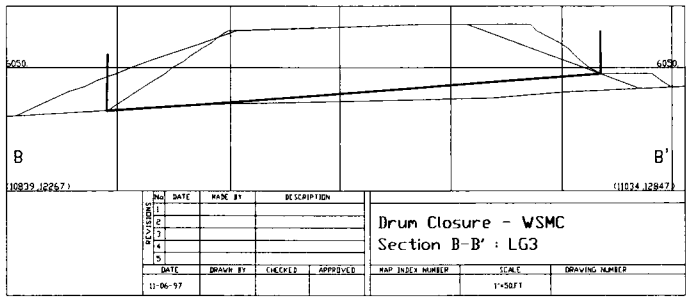
Samples will be collected adjacent to and outside the lined heaps to perform analyses of the natural native soils near the heaps. However, the actual sample locations will be determined in the field, at the time of collection and documented on an "As-built" map. Samples will be composited into one sample for each heap and analyzed using the SPLP test. In addition, the general physical characteristics (i.e., soil type, clay content, porosity and permeability) for each composite will be recorded. The excavator will be used to help collect these native soil samples. The attenuation properties of the Drum native soils may be desired in the future to finalize closure plans. These soil samples will be saved for such testing if needed.


8,000 E
9,000 E
10,000 E
11,000 E
12,000 E
12,500 N
11,500 N
10,500 N
9,500 N
HG3
HG6
HG2
HG1
HG4&5
HG7
LG
LG5
LG3
W1
W2
W3
W4
W7
NR PIT
SW EX PIT
Landfill Area
Cross-Section Line
WSMC Sample Location
Heap Sectional Line
Approximate Project Boundary.
Approximate outer dimension of pad liner.
Components assessed as WSMC's responsibility for characterization.
N
0
200
FEET
MAP 1
WESTERN STATES MINERALS CORP.
DRUM PROJECT
DELTA, UTAH
(Sections 7 and 18, T15S, R10W)


8,000 E
9,000 E
10,000 E
11,000 E
12,000 E
12,500 N
11,500 N
10,500 N
9,500 N
HG3
HG2
HG1
HG4&5
LG1
LG2
LG3
W1
W2
W3
W4
W7
HG7
NP PIT
EX PIT
Cross-Section Line
Approximate Project Boundary.
Approximate outer dimension of pad liner.
Components assessed as WSMC's responsibility for characterization.
N
0 200
FEET
MAP 2
WESTERN STATES MINERALS CORP.
DRUM PROJECT
DELTA, UTAH
(Sections 7 and 18, T15S, R10W)
APPROXIMATE FINAL TOPOGRAPHY







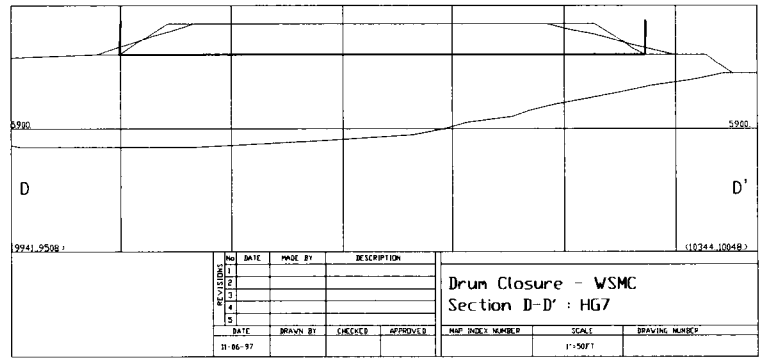


Figure 1

Approximate liner location
Final Topography (Slope - 3H : 1V)
Current Topography
Original Topography

WESTERN STATES MINERALS CORP.

Drum Mine Closure - WSMC

DELTA, UTAH

CROSS SECTIONS OF HEAPS

D:\ACAD\DRUM\SECTIONS.dwg

WESTERN STATES MINERALS CORPORATION

February 3, 1998

Mr. Ron Teseneer
U.S. Dept. of the Interior
BLM- House Range/Warm Springs Resource Area
35 East 500 North
Fillmore, UT. 84631

and

Mr. Wayne Hedberg
State of Utah-Dept. of Natural Res.
DOGM-Minerals Program
P.O. Box 145801
Salt Lake City, UT. 84114-5801

RE: Letter of Response to the meeting held between representatives of the BLM, DOGM, and WSMC on January 13, 1998

Dear Ron and Wayne:

This letter is written in response to the meeting that we both attended on January 13, 1998 at the DOGM's Office Complex in Salt Lake City. The meeting included representatives from the BLM's State Office in Salt Lake City, UT. and House Range/Warm Springs Resource Area Office in Fillmore, UT.; DOGM's technical staff in Salt Lake City, UT.; and Western States Minerals Corp. The meeting lead to the clarification of several issues; the most prominent being the resolution of the proposed Characterization Sampling Program for Heap Leach Pads and Waste Rock Dumps located at the Drum Mine, dated Nov. 1997. In addition, I understand your need for a brief Synopsis of the Proposed Reclamation Plan for the site to include in the Environmental Assessment (EA), that your agency will be writing. Of course, the results of the heap and waste dump sampling and analysis program will provide the data necessary to develop the final Reclamation Plan for the Drum Mine; but the Synopsis will give you a good approximation of the general reclamation that will be proposed. The last request made was for a proposed schedule of site activities, beginning with sampling and proceeding through completion of reclamation at the Drum Mine area. Therefore, in an effort to keep the response to each issue clear and concise, I'll develop a separate write-up for each and attach them to this cover letter.

I do have a question that requires clarification, and would appreciate your prompt response. In a letter from E.B. King (Jumbo) to W. Hedberg (DOGM) dated Feb. 1995, Jumbo discusses the identification of available growth media found within the project boundary. However, the quality of those areas do not apear to have been tested. Therefore, first, WSMC requests confirmation from the BLM and/or DOGM that those quantities of growth media referred to in Jumbo's February 1995 letter, are valid; and, second, if those quantities are valid, does the agronomic quality of this growth media need to be analyzed?

If you have any questions or comments concerning the attached information, please call me or Jim Ashton at your convenience at the number listed below.

Sincerely,

E.M. (Buzz) Gerick
Vice President of Operations

cc: Al Cerny- WSMC, Wheat Ridge
Jim Ashton- WSMC, Reno
DRUM file

250 S. Rock Blvd., Suite 130 ▲ Reno, NV 89502 ▲ (702) 856-3339 ▲ FAX (702) 856-1818

ADDENDUM TO THE CHARACTERIZATION SAMPLING PROGRAM FOR HEAP LEACH PADS AND WASTE ROCK DUMPS LOCATED AT THE DRUM MINE, dated November 1997

In addition to the original proposals stated in the *Characterization Sampling Program for Heap Leach Pads and Waste Rock Dumps located at the Drum Mine - dated November 1997;* this Addendum includes a proposal to sample and analyze several other areas: 1) areas where growth media might be recovered, within and outside the project boundary; and 2) Waste Dump # 1.

Growth Media sampling plan The areas identified, were presented to WSMC by BLM representatives, as possible areas where growth media might be salvaged for later use during reclamation activities. The areas to be sampled are identified on the attached map - Addendum Figure 1.

The following sampling and analysis criteria will be followed for the proposed growth media testing areas:

- At least one test pit per 2.5 acres will be excavated to evaluate and sample the growth media areas. The test pits will be excavated using an excavator or backhoe. Cross country travel will be used to access the test pit sites. Once sampling of the test pits is completed, they will be back-filled and reclaimed.

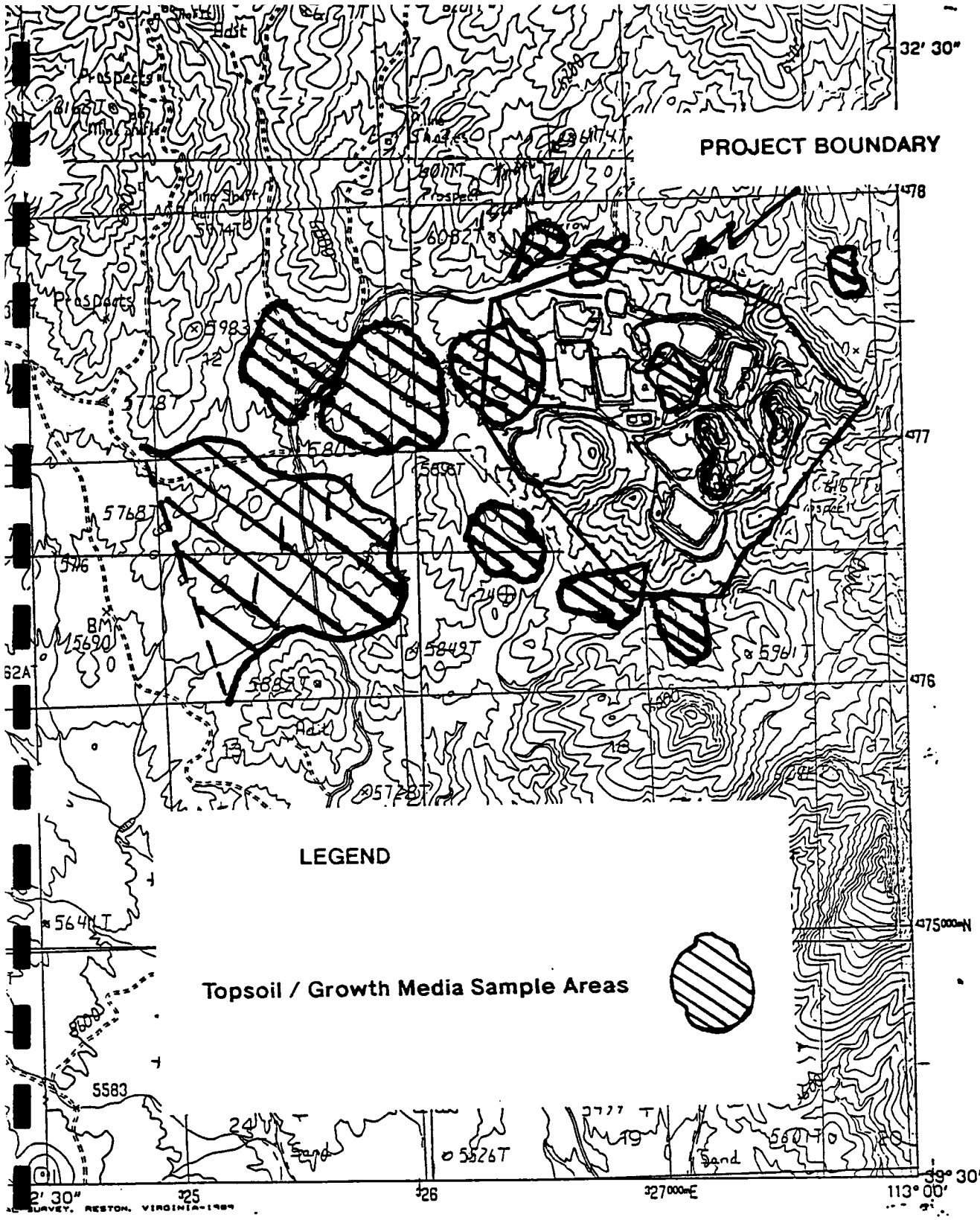
- At least one composite sample will be developed for each five to ten acre parcel (e.g. this assumes one set of samples for each soil horizon within this parcel). The various soil horizons in each excavation will be sampled individually. Sample compositing will be done, to the extent possible, in a manner that will prevent mixing of the various soil horizons. This is a generalized criteria that may be modified in the field, depending upon what we encounter. In addition, for each excavation, the depth or thickness of each soil horizon will be recorded so that a total amount of soil can be quantified from the recordations.

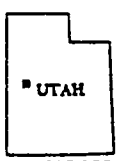
- The analysis criteria for the composite samples will generally involve the following constituents called for in the DOGM Minerals Program:

1. Texture
2. pH
3. EC (conductivity)
4. Saturation percentage
5. SAR
6. Percent organic matter
7. CEC (cation exchange capacity)
8. Alkalinity
9. $CaCO_3$
10. Sulfur (acid potential)
11. Selenium
12. Total nitrogen
13. Nitrate nitrogen
14. Phosphorus (as P_2O_5)
15. Potassium (as K_2O)

The data generated from this testwork should provide the quantity and quality of growth media available for reclamation purposes at or near the Drum minesite. This will then be incorporated into the proposed Reclamation Plan for the site.

Waste Dump # 1 sampling plan- Assuming WSMC's proposal regarding reclamation of Waste Dump # 1 is accepted as written (see *Settlement and Reclamation Agreement* submitted Feb. 3, 1998), Waste Dump # 1 will be sampled and analyzed using the same criteria as presented in the original text entitled *Characterization Sampling Program for Heap Leach Pads and Waste Rock Dumps located at the Drum Mine - dated November 1997.* The sample locations are identified on the attached map - Addendum Figure 2.





QUADRANGLE LOCATION

1	2	3	1 Topaz Mountain West 2 Topaz Mountain East 3 Picture Rock Hills 4 Topaz Mountain SW 5 Drum Mts. Well 6 Whirlwind Valley NW 7 Little Drum Pass 8 Smelter Knolls West
4		5	
6	7	8	

ADJOINING 7.5' QUADRANGLE NAMES

ROAD LEGEND

Improved Road . . . . . ——

Unimproved Road . . . . . – – – –

Trail . . . . . – – – –

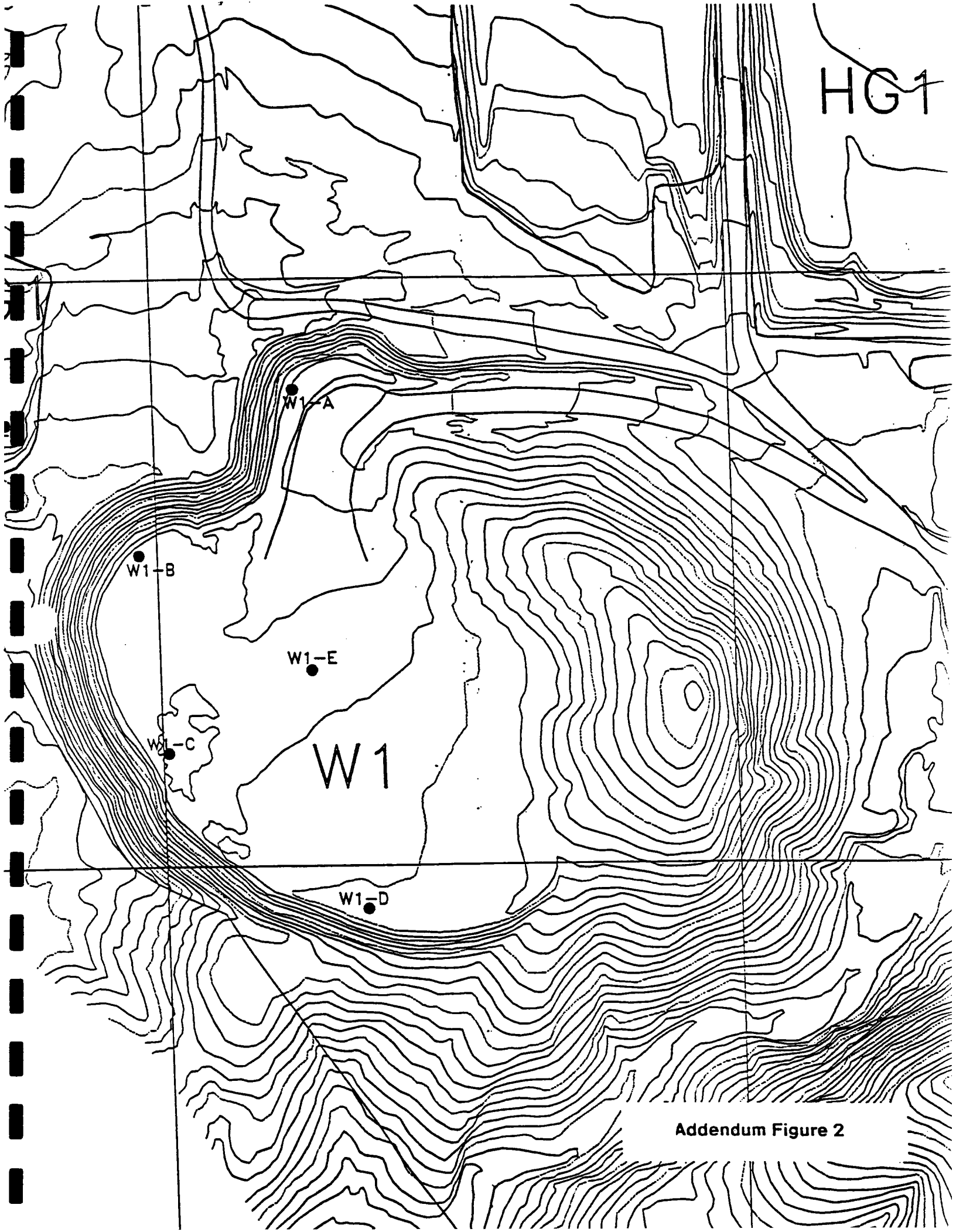
Interstate Route U.S. Route State Route

Addendum Figure 1

LADY LAIRD PEAK, UTAH

PROVISIONAL EDITION 1988

39113-E1-TF-024



Addendum Figure 2

SYNOPSIS OF PROPOSED RECLAMATION PLAN
for the
DRUM MINE

The following generalized parameters will be incorporated into a revised Reclamation Plan for the Drum Mine; and then refined, when the data gathered during the sampling and characterization program is completed and incorporated into the final product. This assumes (e.g. based on a preliminary composite sample of the waste rock dumps and the spent ore from the heaps) that the material located on the waste dumps and the heap leach pads is benign and can be moved off the existing containment, without causing any adverse impact to the local or regional ecosystem. This hypothetical plan envisions the whole site being reclaimed to a similar standard; however, it only specifically, addresses that reclamation work that Western States Minerals Corporation (WSMC) is responsible for.

Goals of the Reclamation Plan

- Ensure public safety, and reduce or eliminate adverse impacts

- Minimize off-site impacts by controlling infiltration, erosion, sedimentation and related degradation of drainages that pass through the site

- Return the disturbed areas to a stabilized condition similar to that which existed prior to mining activities

- Re-establish a stable environment that will support a diverse self-sustaining vegetation and wildlife habitat, consistent with accepted land use objectives

- Achieve a visual compatibility with the surrounding landscape

Reclamation Plan parameters

- Regrade heaps and waste dumps to an approximate 3H to 1V slope; and shaped to reduce the potential for standing water

- Application of 6 to 12 inches of growth medium (e.g. soil and substitute topsoil) to the regraded surfaces. This depends upon successfully locating an adequate amount of growth medium to complete the task, within and slightly outside the project boundary. The application amount is not only dependent upon the availability, but also on the area where it will be applied (e.g. aspect, availability of existing fines, toxicity characteristics, if any, and ability to support a self-sustaining vegetative growth). All growth medium will be evaluated for its ability to sustain vegetation, and will be adjusted with fertilizer or other additives, accordingly.

- Surface drainages will be reestablished throughout the property; to prevent excessive ponding or erosion by meteoric waters, falling on or flowing through the property

- Haul and access roads, associated with each heap or waste dump, will be ripped, regraded, and growth medium applied

- Wherever growth medium is applied, the surface will be roughened to prevent erosion, as a seedbed preparation, and to harvest meteoric water to enhance plant growth

- Finally, an appropriate seed mixture will be applied to all reclaimed surfaces

A PROPOSED SCHEDULE OF ACTIVITIES LEADING TO COMPLETION OF RECLAMATION AT THE DRUM MINE

The following is preliminary schedule of activities leading to completion of reclamation at the Drum mine. This schedule assumes that on-site work would commence during April 1998, and progress through final reclamation. ***Note: This schedule only covers that work associated with Western States Minerals Corp. responsibility.***

Activity	Date
- Receipt of Regulatory agency approval of the *Characterization Sampling Program for the Heap Leach Pads and Waste Rock Dumps located at the Drum Mine*	April 1, 1998
- Field sampling of Drum mine	April 14 - May 1, 1998
- Sample analysis (assumes 6 wk. to 2 mos.)	May 4 - June 26, 1998
- Submittal of *Reclamation Plan for the Drum Mine* to Regulatory agencies for approval	July 14, 1998
- Receipt of Regulatory approval for the *Reclamation Plan for the Drum Mine* (assumes 30 to 60 days turn around)	Aug. 14 to Sept. 14, 1998
- Initiate reclamation at Drum mine	Sept. 29, 1998
- Complete reclamation at Drum mine (assumes approx. 6 mos. to complete)	April 15, 1999
- Post closure monitoring period (assumes approx. 2 year monitor period prior to release)	April 15, 1999 through April 15, 2001

APPENDIX B

Characterization Sampling Laboratory Results and Summary Tables

TABLE B-1 Spent Ore Heaps Characterization Results
TABLE B-2 Waste Dump Characterization Results
TABLE B-3 Process Facilities Characterization Results
TABLE B-4 Soil Characterization Results

LABORATORY RESULTS:

MWMP Profile II Results - All Heaps
WAD Cyanide (mg/kg) and Moisture Percent - All Heaps and Pond Solids
ANP/AGP Results - All Heaps and Waste Dumps
NDEP Profile II Results - Pregnant and Barren Pond Solution
NDEP Profile II Results - Heap Perimeter Soil Samples (4)
Hydraulic Conductivity Testing Results - All Heaps
Soil Test Results - All Nine (9) Tests

TABLE B-1
WESTERN STATES MINERALS CORPORATION
SPENT ORE HEAPS CHARACTERIZATION RESULTS

PARAMETER	Limit	LG1	LG2-1	LG2-2	LG2-3	LG3-1	LG3-2	LG3-3	HG1-1	HG1-2	HG2-1	HG2-2	HG3-1	HG3-2	HG4&5-1	HG4&5-2	HG4&5-3	HG6-1	HG6-2	HG7-1	HG7-2	HG7-3	HG7-4
pH	6.5-8.5	7.91	8.36	8.73	7.64	8.27	7.44	7.77	9.03	8.77	8.65	8.95	7.66	7.51	8.21	8.58	8.21	7.06	7.58	8.69	7.8	8.92	8.36
Alkalinity, CaCO3		46	44	41	52	34	36	58	93	64	47	74	100	66	92	90	96	48	45	66	50	65	44
Bicarbonate		56	51	46	63	41	40	71	94	68	48	76	122	80	112	110	117	59	55	71	61	62	51
Aluminum		0.16	1.2	1.8	0.22	0.3	0.36	0.86	1.4	0.12	0.06	0.04	1.2	0.78	1.1	0.4	1.8	3.2	0.82	2.3	0.52	2.9	0.16
Antimony		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Arsenic	0.05	0.005	0.024	0.045	<0.005	0.025	<0.005	0.023	0.094	0.028	0.014	0.021	0.096	0.083	0.081	0.016	0.013	0.028	0.039	0.056	0.022	0.19	0.055
Barium	2	0.11	0.2	0.18	0.08	0.26	0.12	0.14	0.18	0.18	0.16	0.16	0.15	0.19	0.17	0.16	0.18	0.23	0.21	0.28	0.13	0.24	0.19
Beryllium		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron		0.17	0.12	0.14	0.07	0.15	0.08	0.18	0.21	0.15	0.1	0.21	0.2	0.17	0.16	0.19	0.17	0.15	0.12	0.33	0.09	0.19	0.09
Cadmium	0.005	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Calcium		38	3.5	3.1	83	5	40	3.8	1.7	2.3	2.3	1.6	5.1	2.9	6.7	2.3	5.3	5.5	4.5	7.4	4.3	6.7	3.3
Chloride	250	60	70	45	140	29	99	38	43	57	44	73	10	16	22	57	1.4	1.3	1.2	77	35	46	95
Chromium	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	1.3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.01	0.04	0.03	<0.01	0.06	0.02	0.02	0.01	<0.01	0.01	<0.01
Fluoride	2	0.85	0.47	0.53	0.2	0.31	0.35	0.58	0.82	0.96	0.38	0.62	0.57	0.28	0.33	0.58	0.35	0.32	0.27	0.82	0.4	0.66	0.58
Iron	0.3	<0.05	0.31	0.76	<0.05	0.11	<0.05	0.12	0.94	0.06	<0.05	<0.05	0.56	0.39	0.72	0.2	0.99	2.1	0.53	1.1	0.07	0.86	0.11
Lead	0.015	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.007	<0.002	<0.002	<0.002	0.003	0.004	0.006	<0.002	0.006	0.019	0.005	0.018	<0.002	0.011	<0.002
Magnesium	125	7.9	0.6	<0.5	15	0.8	6.2	0.6	0.8	0.5	<0.5	<0.5	0.8	0.7	1.4	<0.5	1.5	2.2	1.1	1.9	0.8	1.7	0.7
Manganese	0.05	0.02	<0.01	0.01	0.48	<0.01	0.02	<0.01	0.07	<0.01	<0.01	<0.01	<0.01	0.01	0.02	<0.01	0.03	0.04	0.01	0.02	<0.01	0.03	<0.01
Mercury	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Nickel		<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nitrate Nitrogen	10	<1	3.6	1.8	4.1	<1	3.1	1.2	1.1	2.2	1.7	1.7	<1.0	<1.0	<1.0	1.1	<1.0	<1	<1	4.6	1.7	1.3	5.1
Nitrite Nitrogen		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Potassium		2.4	2.1	1.6	3.5	1.7	2	1.9	2.7	2	1.7	1.9	1.9	2	2.2	2	2.3	1.6	1	3.5	1.3	2.2	2
Selenium	0.05	<0.005	<0.005	<0.005	0.011	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sodium		63	87	56	160	43	140	73	64	91	68	100	65	48	41	92	37	18	17	110	60	70	110
Sulfate	250	190	55	40	400	45	240	93	29	53	30	44	18	13	16	31	7	8	7	42	87	32	80
Thallium		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.001	0.001
TDS	500-1000	630	320	310	840	210	730	300	290	280	130	200	190	110	180	500	200	67	60	350	260	290	370
Cyanide, WAD	0.2	<0.01	0.018	0.013	0.011	0.014	0.021	<0.01	0.01	0.021	0.026	0.013	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005	0.051	0.03	0.031	0.044
Zinc	5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11	0.06	<0.05	0.08	<0.05	0.06	<0.05
Bismuth		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Gallium		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Lithium		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum		<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Phosphorus		0.9	0.86	<0.5	0.92	<0.5	0.98	<0.5	<0.5	0.73	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	0.96	<0.5	0.73
Scandium		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Strontium		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tin		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Titanium		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Vanadium		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Moisture, %		2.1	3.5	5.3	6	5.4	6.1	4.2	7	7.4	7	7.5	5.8	5.2	5.7	5.8	5.5	3.2	3.3	6.4	3.1	1.4	3.8
Cyanide, WAD mg/kg		<0.05	0.3	<0.05	<0.05	<0.05	<0.05	2.6	0.41	0.73	0.49	0.43	<0.05	0.34	0.34	0.32	<0.05	<0.05	<0.05	0.52	0.3	<0.05	0.3
Neutralization Potential		90	10	49	1	50	59	57	103	277	178	99	23	12	7	50	29	3	7	38	52	48	16
Acid Gen. Potential		13	25	12	32	26	11	4.1	2.2	5.6	13	6.3	8.1	9.1	4.7	7.2	13	1.3	5	16	14	6.9	28
Ratio NP/AP	<3	6.9	0.4	4.1	0.0	1.9	5.4	13.9	46.8	49.5	13.7	15.7	2.8	1.3	1.5	6.9	2.2	2.3	1.4	2.4	3.7	7.0	0.6
Acid Gen. Sulf. Poten.			5		8.4	10							1.3	1.6	0.3		0.3	0.3	0.3	0.3			3.4
Ratio NP/APS	<3		2.0		0.1	5.0							17.7	7.5	23.3		96.7	10.0	23.3	126.7			4.7
Hydraulic Conductivity Testing:																							
Initial Moisture, %		2.7	1.5	2.7	5.8	5.7	7	4.9	8.3	7.3	6	6.7	6.3	3.3	5.1	5.1	4.4	2.6	3.1	4.5	4.2	1.8	4.4
Final Moisture, %		12.8	11.4	13	16.1	12.3	14.4	12.1	14.2	14.1	15.4	13.8	9.6	8.1	10.4	7.7	7.6	11.9	14.4	7.1	12.7	11.2	13.6
Start Dry Density, pcf		86.5	86	87.4	78.2	78.8	79.7	82.8	77.7	78	75.9	73	78	84.1	82	82.2	81.3	85.6	87.6	89.8	89.9	90	85
Final Dry Density, pcf		106.3	104	109.3	87.2	86.9	104.5	104.5	113	108.3	110.8	111.4	96.3	96.9	103.3	97.8	98.8	98	113.9	102.8	111.9	109.5	107.2
Final Porosity		0.301	0.32	0.234	0.419	0.41	0.31	0.31	0.258	0.305	0.29	0.278	0.368	0.374	0.335	0.353	0.361	0.365	0.266	0.332	0.226	0.309	0.28
Hydraulic Cond., cm/sec		$1.5x10^{-1}$	$1.5x10^{-1}$	$2.2x10^{-2}$	$5.1x10^{-2}$	$1.7x10^{-1}$	$1.1x10^{-2}$	$1.3x10^{-1}$	$1.1x10^{-2}$	$1.5x10^{-2}$	$7.1x10^{-5}$	$7.4x10^{-5}$	$1.8x10^{-2}$	$9.5x10^{-2}$	$5.5x10^{-2}$	$1.1x10^{-1}$	$1.6x10^{-1}$	$9.0x10^{-2}$	$8.0x10^{-2}$	$7.8x10^{-2}$	$6.3x10^{-2}$	$1.6x10^{-1}$	$2.0x10^{-2}$
Specific Retention		0.218	0.19	0.228	0.225	0.171	0.241	0.203	0.257	0.245	0.273	0.246	0.148	0.126	0.121	0.172	0.12	0.187	0.262	0.117	0.227	0.197	0.234

Note: Shading indicates an exceedance.

TABLE B-2
WESTERN STATES MINERALS CORPORATION
WASTE DUMP CHARACTERIZATION RESULTS

PARAMETER	Limit	W1	W2	W3	W7
Neutralization Potential		332	706	64	144
Acid Gen. Potential		15	2.5	11	60
Ratio NP/AP	<3	22.1	282.4	5.8	2.4
Acid Gen. Sulf. Poten.					29
Ratio NP/APS	<3				5.0

Note: Shading indicates an exceedance.

TABLE B-3
WESTERN STATES MINERALS CORPORATION
PROCESS FACILITIES CHARACTERIZATION RESULTS

PARAMETER	Limit	PREG Solids	BARREN Solids	PREG Water	BARREN Water
pH	6.5-8.5	8.29	12.09	9.27	10.23
Alkalinity, CaCO3		358	1900	90.4	771
Bicarbonate		437	0	279	350
Aluminum		0.073	<0.025	0.719	0.629
Antimony		<0.003	<0.003	<0.003	<0.003
Arsenic	0.05	0.08	<0.005	0.061	0.034
Barium	2	0.05	0.14	0.069	<0.02
Beryllium		<0.001	<0.001	<0.002	<0.002
Boron		0.46	4.9		
Cadmium	0.005	<0.002	<0.002	<0.002	<0.002
Calcium		14	700	16	3.62
Chloride	250	325	365	1360	1350
Chromium	0.1	<0.01	<0.01	<0.005	<0.005
Copper	1.3	0.02	0.32	0.013	0.085
Fluoride	2	0.98	1.9	1.4	2.5
Iron	0.3	<0.05	<0.05	0.374	0.309
Lead	0.015	<0.002	<0.002	0.015	<0.007
Magnesium	125	8.6	<25	14.1	6.11
Manganese	0.05	0.18	<0.01	0.041	0.013
Mercury	0.002	<0.0002	<0.0002	<0.0005	<0.0005
Nickel		0.01	<0.01	<0.02	<0.02
Nitrate Nitrogen	10	<1	<1	5.9	0.3
Nitrite Nitrogen		<0.5	<0.5	<0.1	<0.1
Potassium		15	29	7.36	15.8
Selenium	0.05	0.011	<0.005	0.036	0.032
Silver	0.1	<0.01	<0.01	<0.010	<0.010
Sodium		930	420	1110	1330
Sulfate	250	800	800	654	444
Thallium		<0.001	<0.001	<0.001	<0.001
TDS	500-1000	1940	1940	3960	4520
Cyanide, WAD	0.2	<0.01	0.042	0.025	<0.025
Zinc	5	<0.05	<0.05	<0.05	<0.05
Bismuth		<0.5	<0.5	<0.2	<0.2
Cobalt		<0.5	<0.5	0.046	0.034
Gallium		<0.5	<0.5	<0.05	<0.05
Lithium		<0.5	<0.5	0.059	0.038
Molybdenum		<0.25	<0.25	0.032	0.055
Phosphorus		<0.5	<0.5	<0.05	<0.05
Scandium		<0.5	<0.5	<0.002	<0.002
Strontium		<0.5	<0.5	0.375	0.036
Tin		<0.5	<0.5	<0.05	<0.05
Titanium		<0.1	<0.1	0.005	<0.005
Vanadium		<0.15	<0.15	<0.02	<0.02
Cyanide, WAD mg/kg		<.2	110		

Note: Shading indicates an exceedance

TABLE B-4
WESTERN STATES MINERALS CORPORATION
SOIL CHARACTERIZATION RESULTS

PARAMETER	Limit	HG1 EDGE	HG2 EDGE	HG3 EDGE	HG6 EDGE	SOIL #1	SOIL #2	SOIL #3	SOIL #4	SOIL #5	SOIL #6	SOIL #7	SOIL #8	SOIL #9
pH	6.5-8.5	8.07	8.36	8.18	8.38									
Alkalinity, CaCO3		142	165	173	140									
Bicarbonate		173	189	211	171									
Aluminum		0.53	0.35	0.5	<0.025									
Antimony		<0.003	<0.003	<0.003	<0.003									
Arsenic	0.05	<0.005	<0.005	0.029	0.054									
Barium	2	0.15	0.06	0.08	0.03									
Beryllium		<0.001	<0.001	<0.001	<0.001									
Boron		2.1	2.2	0.14	0.3									
Cadmium	0.005	<0.003	<0.003	<0.003	<0.003									
Calcium		580	140	250	9									
Chloride	250	2130	180	1215	130									
Chromium	0.1	<0.01	<0.01	<0.01	<0.01									
Copper	1.3	<0.01	0.01	0.02	0.01									
Fluoride	2	1.8	1.5	0.56	0.69									
Iron	0.3	<0.05	<0.05	<0.05	<0.05									
Lead	0.015	<0.002	<0.002	<0.002	<0.002									
Magnesium	125	75	12	39	1									
Manganese	0.05	<0.01	<0.01	<0.01	<0.01									
Mercury	0.002	<0.0002	<0.0002	<0.0002	<0.0002									
Nickel		<0.01	0.02	0.04	<0.01									
Nitrate Nitrogen	10	30	12	<1	1.2									
Nitrite Nitrogen		<0.5	<0.5	<0.5	<0.5									
Potassium		28	23	10	13									
Selenium	0.05	<0.005	<0.005	<0.005	<0.005									
Silver	0.1	<0.01	<0.01	<0.01	<0.01									
Sodium		170	840	860	78									
Sulfate	250	1940	1930	780	100									
Thallium		<0.001	<0.001	<0.001	<0.001									
TDS	500-1000	6600	3380	3410	430									
Cyanide, WAD	0.2	0.072	<0.005	0.01	0.012									
Zinc	5	<0.05	<0.05	<0.05	<0.05									
Bismuth		<0.5	<0.5	<0.5	<0.5									
Cobalt		<0.5	<0.5	<0.5	<0.5									
Gallium		<0.5	<0.5	<0.5	<0.5									
Lithium		<0.5	<0.5	<0.5	<0.5									
Molybdenum		<0.25	<0.25	<0.25	<0.25									
Phosphorus		0.84	0.77	<0.5	0.98									
Scandium		<0.5	<0.5	<0.5	<0.5									
Strontium		6.4	1.7	2.8	<0.5									
Tin		<0.5	<0.5	<0.5	<0.5									
Titanium		<0.1	<0.1	<0.1	<0.1									
Vanadium		<0.15	<0.15	<0.15	<0.15									
Soil Test Results:														
Texture						Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Loamy Sand	Loamy Sand	Sandy Loam	Sandy Loam
Lime						Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
pH						8.2	8	8.7	8.4	8.1	7.9	8.5	8	8.1
Salinity - Ece (mmhos/cm)						0.4	0.4	0.7	5.6	0.3	4.6	1.4	20	1.4
Phosphorus						2.2	1	2.5	1.3	1.9	1.6	1.6	3.2	2.4
Potassium						174	80	97	81	179	46	111	57	218
Nitrate - Nitrogen						2.8	1.5	1.5	9.3	1.5	1.3	5.2	6	24.2
SAR						3	0.69	15	24	2.36	7.58	15	36	2.78
Organic Matter, %						0.76	0.68	0.51	0.43	0.83	0.31	0.58	0.49	0.51
CEC, meq/100g						16.2	13.8	19.5	12.3	15.9	30.1	21	9.3	9.3
Sodic						NO	NO	YES	YES	NO	NO	YES	YES	NO

Note: Shading indicates an item of concern.

CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
Fax (702) 355-0817

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19650
Account No.: MCCLD

Telephone: 356-1300 Fax: 356-8917

Work Authorized By: Gene M^{c} Clelland
Date Sampled: 06/16/98
Number of Samples: 3
Source: 2591 M-1 LG1 Comp III
Chemax Control No. 98-4053 thru 4055
Notes: **PROFILE II**

Date Submitted: 06/16/98
Sampled By: Client
Your Reference:

Parameter	Results
pH	7.91
Alkalinity, mg/L as $CaCO_3$	46
Bicarbonate, mg/L	56
Aluminum, mg/L	0.16
Antimony, mg/L	<0.003
Arsenic, mg/L	<0.005
Barium, mg/L	0.11
Beryllium, mg/L	<0.001
Boron, mg/L	0.17
Cadmium, mg/L	<0.003
Calcium, mg/L	38
Chloride, mg/L	60
Chromium, mg/L	<0.01
Copper, mg/L	<0.01

Remarks:

Analysis By: Faulstich, M./Joyce/aqualab Date: 07/08/98

Approved By: Date: 07/08/98

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Analytical and Environmental Chemists
EPA Lab ID #NV004

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Fax (702) 355-0817

LABORATORY REPORT

Report To: M^c Clelland Laboratories, Inc.
Source: 2591 M-1 LG1 Comp III

Lab Report No.: 19650

Parameter	Results
Fluoride, mg/L	0.85
Iron, mg/L	<0.05
Lead, mg/L	<0.002
Magnesium, mg/L	7.9
Manganese, mg/L	0.02
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L	<1
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	2.4
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	63
Sulfate, mg/L	190
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	630
Cyanide, WAD, mg/L	<0.01
Zinc, mg/L	<0.05
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 6.37 6.61 1.9

Remarks:

Analysis By: Eckert/Joyce/Stowers/aqualab/Accu-Lab

Date: 07/08/98

Approved By:

Date: 07/08/98

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LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc.
Source: 2591 M-1 LG1 Comp III
Lab Report No.: 19650

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	0.90
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert
Date: 07/08/98

Approved By:
Date: 07/08/98

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LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19651
Account No.: MCCLD

Telephone: 356-1300 Fax: 356-8917

Work Authorized By: Gene M^{c} Clelland
Date Sampled: 06/16/98 Date Submitted: 06/16/98
Number of Samples: 3 Sampled By: Client
Source: 2591 M-2 LG2-1 Comp III Your Reference:
Chemax Control No. 98-4056 thru 4058
Notes: **PROFILE II**

Parameter	Results
pH	8.36
Alkalinity, mg/L as $CaCO_3$	44
Bicarbonate, mg/L	51
Aluminum, mg/L	1.2
Antimony, mg/L	<0.003
Arsenic, mg/L	0.024
Barium, mg/L	0.20
Beryllium, mg/L	<0.001
Boron, mg/L	0.12
Cadmium, mg/L	<0.003
Calcium, mg/L	3.5
Chloride, mg/L	70
Chromium, mg/L	<0.01
Copper, mg/L	<0.01

Remarks:

Analysis By: Faulstich, M./Joyce/aqualab Date: 07/08/98

Approved By: Date: 07/08/98

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LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc. Lab Report No.: 19651
Source: 2591 M-2 LG2-1 Comp III

Parameter	Results
Fluoride, mg/L	0.47
Iron, mg/L	0.31
Lead, mg/L	<0.002
Magnesium, mg/L	0.6
Manganese, mg/L	<0.01
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L	3.6
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	2.1
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	87
Sulfate, mg/L	55
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	320
Cyanide, WAD, mg/L	0.018
Zinc, mg/L	<0.05
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 4.06 4.27 2.5

Remarks:

Analysis By: Eckert/Joyce/Stowers/aqualab/Accu-Lab Date: 07/08/98

Approved By: Date: 07/08/98

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LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc.
Source: 2591 M-2 LG2-1 Comp III
Lab Report No.: 19651

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	0.86
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert
Date: 07/08/98

Approved By:
Date: 07/08/98

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LABORATORY REPORT

Report To: M^{C} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19652
Account No.: MCCLD

Telephone: 356-1300 Fax: 356-8917

Work Authorized By: Gene M^{C} Clelland
Date Sampled: 06/16/98 Date Submitted: 06/16/98
Number of Samples: 3 Sampled By: Client
Source: 2591 M-3 LG2-2 Comp III Your Reference:
Chemax Control No. 98-4059 thru 4061
Notes: **PROFILE II**

Parameter	Results
pH	8.73
Alkalinity, mg/L as $CaCO_3$	41
Bicarbonate, mg/L	46
Aluminum, mg/L	1.8
Antimony, mg/L	<0.003
Arsenic, mg/L	0.045
Barium, mg/L	0.18
Beryllium, mg/L	<0.001
Boron, mg/L	0.14
Cadmium, mg/L	<0.003
Calcium, mg/L	3.1
Chloride, mg/L	45
Chromium, mg/L	<0.01
Copper, mg/L	<0.01

Remarks:

Analysis By: Faulstich, M./Joyce/aqualab Date: 07/08/98

Approved By: Date: 07/08/98

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LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc. Lab Report No.: 19652
Source: 2591 M-3 LG2-2 Comp III

Parameter	Results
Fluoride, mg/L	0.53
Iron, mg/L	0.76
Lead, mg/L	<0.002
Magnesium, mg/L	<0.5
Manganese, mg/L	0.01
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L	1.8
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	1.6
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	56
Sulfate, mg/L	40
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	310
Cyanide, WAD, mg/L	0.013
Zinc, mg/L	<0.05
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 2.87 3.17 5.0

Remarks:

Analysis By: Eckert/Joyce/Stowers/aqualab/Accu-Lab Date: 07/08/98

Approved By: Date: 07/08/98

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LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc.
Source: 2591 M-3 LG2-2 Comp III
Lab Report No.: 19652

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	<0.5
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert
Date: 07/08/98

Approved By:
Date: 07/08/98

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LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19653
Account No.: MCCLD

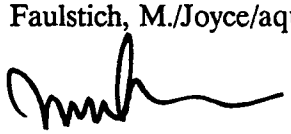
Telephone: 356-1300 Fax: 356-8917

Work Authorized By: Gene M^C Clelland
Date Sampled: 06/16/98 Date Submitted: 06/16/98
Number of Samples: 3 Sampled By: Client
Source: 2591 M-4 LG2-3 Comp III Your Reference:
Chemax Control No. 98-4062 thru 4064
Notes: **PROFILE II**

Parameter	Results
pH	7.64
Alkalinity, mg/L as $CaCO_3$	52
Bicarbonate, mg/L	63
Aluminum, mg/L	0.22
Antimony, mg/L	<0.003
Arsenic, mg/L	<0.005
Barium, mg/L	0.08
Beryllium, mg/L	<0.001
Boron, mg/L	0.07
Cadmium, mg/L	<0.003
Calcium, mg/L	83
Chloride, mg/L	140
Chromium, mg/L	<0.01
Copper, mg/L	<0.01

Remarks:

Analysis By: Faulstich, M./Joyce/aqualab Date: 07/08/98

Approved By:  Date: 07/08/98

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Analytical and Environmental Chemists
EPA Lab ID #NV004
(702) 355-0202
Fax (702) 355-0817

LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc.
Source: 2591 M-4 LG2-3 Comp III
Lab Report No.: 19653

Parameter	Results
Fluoride, mg/L	0.20
Iron, mg/L	<0.05
Lead, mg/L	<0.002
Magnesium, mg/L	15
Manganese, mg/L	0.48
Mercury, mg/L	<0.0002
Nickel, mg/L	0.01
Nitrate Nitrogen, mg/L	4.1
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	3.5
Selenium, mg/L	0.011
Silver, mg/L	<0.01
Sodium, mg/L	160
Sulfate, mg/L	400
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	840
Cyanide, WAD, mg/L	0.011
Zinc, mg/L	<0.05
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 12.3 13.6 5.0

Remarks:

Analysis By: Eckert/Joyce/Stowers/aqualab/Accu-Lab
Date: 07/08/98

Approved By:
Date: 07/08/98

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CHEMAX Laboratories, Inc.
Analytical and Environmental Chemists
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LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc.
Source: 2591 M-4 LG2-3 Comp III
Lab Report No.: 19653

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	0.92
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert
Date: 07/08/98

Approved By:
Date: 07/08/98

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CHEMAX Laboratories, Inc.
Analytical and Environmental Chemists
EPA Lab ID #NV004
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Fax (702) 355-0817

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19654
Account No.: MCCLD

Telephone: 356-1300 Fax: 356-8917

Work Authorized By: Gene M^{c} Clelland
Date Sampled: 06/16/98 Date Submitted: 06/16/98
Number of Samples: 3 Sampled By: Client
Source: 2591 M-5 LG3-1 Your Reference:
Chemax Control No. 98-4065 thru 4067
Notes: **PROFILE II**

Parameter	Results
pH	8.27
Alkalinity, mg/L as $CaCO_3$	34
Bicarbonate, mg/L	41
Aluminum, mg/L	0.30
Antimony, mg/L	<0.003
Arsenic, mg/L	0.025
Barium, mg/L	0.26
Beryllium, mg/L	<0.001
Boron, mg/L	0.15
Cadmium, mg/L	<0.003
Calcium, mg/L	5.0
Chloride, mg/L	29
Chromium, mg/L	<0.01
Copper, mg/L	<0.01

Remarks:

Analysis By: Faulstich, M./Joyce/aqualab Date: 07/08/98

Approved By: Date: 07/08/98

992 Spice Islands Drive, Sparks, Nevada 89431 • P.O. Box 21122, Reno, Nevada 89515

CHEMAX Laboratories, Inc.
Analytical and Environmental Chemists
EPA Lab ID #NV004
(702) 355-0202
Fax (702) 355-0817

LABORATORY REPORT

Report To: M^c Clelland Laboratories, Inc. Lab Report No.: 19654
Source: 2591 M-5 LG3-1

Parameter	Results
Fluoride, mg/L	0.31
Iron, mg/L	0.11
Lead, mg/L	<0.002
Magnesium, mg/L	0.80
Manganese, mg/L	<0.01
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L	<1
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	1.7
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	43
Sulfate, mg/L	45
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	210
Cyanide, WAD, mg/L	0.014
Zinc, mg/L	<0.05
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 2.23 2.44 4.5

Remarks:

Analysis By: Eckert/Joyce/Stowers/aqualab/Accu-Lab Date: 07/08/98

Approved By: Date: 07/08/98

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CHEMAX Laboratories, Inc.
Analytical and Environmental Chemists
EPA Lab ID #NV004
(702) 355-0202
Fax (702) 355-0817

LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc.
Source: 2591 M-5 LG3-1
Lab Report No.: 19654

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	<0.5
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert
Date: 07/08/98

Approved By:
Date: 07/08/98

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LABORATORY REPORT

Report To: M^{C} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19724
Account No.: MCCLD

Telephone: 356-1300 Fax: 356-8917

Work Authorized By: Gene M^{C} Clelland
Date Sampled: 06/19/98
Number of Samples: 3
Source: 2591 M-6 LG3-2 Comp III
Chemax Control No. 98-4256 thru 4258
Notes: **PROFILE II**

Date Submitted: 06/22/98
Sampled By: Client
Your Reference:

Parameter	Results
pH	7.44
Alkalinity, mg/L as $CaCO_3$	36
Bicarbonate, mg/L	40
Aluminum, mg/L	0.36
Antimony, mg/L	<0.003
Arsenic, mg/L	<0.005
Barium, mg/L	0.12
Beryllium, mg/L	<0.001
Boron, mg/L	0.08
Cadmium, mg/L	<0.003
Calcium, mg/L	40
Chloride, mg/L	99
Chromium, mg/L	<0.01
Copper, mg/L	<0.01

Remarks:

Analysis By: Faulstich, M./Joyce/aqualab Date: 07/24/98

Approved By: Date: 07/24/98

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LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc.
Source: 2591 M-6 LG3-2 Comp III

Lab Report No.: 19724

Parameter	Results
Fluoride, mg/L	0.35
Iron, mg/L	<0.05
Lead, mg/L	<0.002
Magnesium, mg/L	6.2
Manganese, mg/L	0.02
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L	3.1
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	2.0
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	140
Sulfate, mg/L	240
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	730
Cyanide, WAD, mg/L	0.021
Zinc, mg/L	<0.05
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 8.60 8.83 1.3

Remarks:

Analysis By: Eckert/Faulstich, M./Joyce/aqualab/Accu-Labs

Date: 07/24/98

Approved By:

Date: 07/24/98

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LABORATORY REPORT

Report To: M^{C} Clelland Laboratories, Inc.
Source: 2591 M-6 LG3-2 Comp III
Lab Report No.: 19724

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	0.98
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert
Date: 07/24/98

Approved By:
Date: 07/24/98

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LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19725
Account No.: MCCLD

Telephone: 356-1300 Fax: 356-8917

Work Authorized By: Gene M^C Clelland
Date Sampled: 06/19/98
Number of Samples: 3
Source: 2591 M-7 LG3-3 Comp III
Chemax Control No. 98-4259 thru 4261
Notes: **PROFILE II**

Date Submitted: 06/22/98
Sampled By: Client
Your Reference:

Parameter	Results
pH	7.77
Alkalinity, mg/L as $CaCO_3$	58
Bicarbonate, mg/L	71
Aluminum, mg/L	0.86
Antimony, mg/L	<0.003
Arsenic, mg/L	0.023
Barium, mg/L	0.14
Beryllium, mg/L	<0.001
Boron, mg/L	0.18
Cadmium, mg/L	<0.003
Calcium, mg/L	3.8
Chloride, mg/L	38
Chromium, mg/L	<0.01
Copper, mg/L	<0.01

Remarks:

Analysis By: Faulstich, M./Joyce/aqualab Date: 07/24/98

Approved By: Date: 07/24/98

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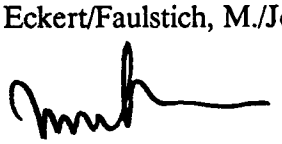
LABORATORY REPORT

Report To: M^{C} Clelland Laboratories, Inc. Lab Report No.: 19725
Source: 2591 M-6 LG3-3 Comp III

Parameter	Results
Fluoride, mg/L	0.58
Iron, mg/L	0.12
Lead, mg/L	<0.002
Magnesium, mg/L	0.6
Manganese, mg/L	<0.01
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L	1.2
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	1.9
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	73
Sulfate, mg/L	93
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	300
Cyanide, WAD, mg/L	<0.01
Zinc, mg/L	<0.05
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 3.46 4.39 10

Remarks:

Analysis By: Eckert/Faulstich, M./Joyce/aqualab/Accu-Labs Date: 07/24/98

Approved By:  Date: 07/24/98

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LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc.
Source: 2591 M-7 LG3-3 Comp III
Lab Report No.: 19725

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	<0.5
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert
Date: 07/24/98

Approved By:
Date: 07/24/98

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EPA Lab ID #NV004

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LABORATORY REPORT

Report To: M^{C} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19781
Account No.: MCCLD

Telephone: 356-1300 Fax: 356-8917

Work Authorized By: Gene M^{C} Clelland
Date Sampled: 06/23/98 Date Submitted: 06/24/98
Number of Samples: 3 Sampled By: Client
Source: 2591 M-14 HG1-1 Comp III Your Reference:
Chemax Control No. 98-4346 thru 4348
Notes: **PROFILE II**

Parameter	Results
pH	9.03
Alkalinity, mg/L as $CaCO_3$	93*
Bicarbonate, mg/L	94
Aluminum, mg/L	1.4
Antimony, mg/L	<0.003
Arsenic, mg/L	0.094
Barium, mg/L	0.18
Beryllium, mg/L	<0.001
Boron, mg/L	0.21
Cadmium, mg/L	<0.003
Calcium, mg/L	1.7
Chloride, mg/L	43
Chromium, mg/L	<0.01
Copper, mg/L	0.01

Remarks: * For purpose of ion balance calculations, CO_3^{2-} = 9.6 mg/L.

Analysis By: Faulstich, M./Joyce/aqualab Date: 08/03/98

Approved By: Date: 08/03/98

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EPA Lab ID #NV004

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LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc.
Source: 2591 M-14 HG1-1 Comp III

Lab Report No.: 19781

Parameter	Results
Fluoride, mg/L	0.82
Iron, mg/L	0.94
Lead, mg/L	0.007
Magnesium, mg/L	0.8
Manganese, mg/L	0.07
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L	1.1
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	2.7
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	64
Sulfate, mg/L	29
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	290
Cyanide, WAD, mg/L	0.010
Zinc, mg/L	0.11
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 3.21 3.80 8.4

Remarks:

Analysis By: Eckert/Faulstich, M./Joyce/aqualab/Accu-Labs

Date: 08/03/98

Approved By:

Date: 08/03/98

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CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

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LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc.
Source: 2591 M-14 HG1-1 Comp III

Lab Report No.: 19781

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	<0.5
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert

Date: 08/03/98

Approved By:

Date: 08/03/98

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Analytical and Environmental Chemists
EPA Lab ID #NV004

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LABORATORY REPORT

Report To: M^{C} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19782
Account No.: MCCLD

Telephone: 356-1300 Fax: 356-8917

Work Authorized By: Gene M^{C} Clelland
Date Sampled: 06/23/98 Date Submitted: 06/24/98
Number of Samples: 3 Sampled By: Client
Source: 2591 M-15 HG1-2 Comp III Your Reference:
Chemax Control No. 98-4349 thru 4351
Notes: **PROFILE II**

Parameter	Results
pH	8.77
Alkalinity, mg/L as $CaCO_3$	64*
Bicarbonate, mg/L	68
Aluminum, mg/L	0.12
Antimony, mg/L	<0.003
Arsenic, mg/L	0.028
Barium, mg/L	0.18
Beryllium, mg/L	<0.001
Boron, mg/L	0.15
Cadmium, mg/L	<0.003
Calcium, mg/L	2.3
Chloride, mg/L	57
Chromium, mg/L	<0.01
Copper, mg/L	<0.01

Remarks: * For purpose of ion balance calculations, CO_3^{2-} = 4.8 mg/L.

Analysis By: Faulstich, M./Joyce/aqualab Date: 08/03/98

Approved By: Date: 08/03/98

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EPA Lab ID #NV004

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LABORATORY REPORT

Report To: M^{C} Clelland Laboratories, Inc. Lab Report No.: 19782
Source: 2591 M-15 HG1-2 Comp III

Parameter	Results
Fluoride, mg/L	0.96
Iron, mg/L	0.06
Lead, mg/L	<0.002
Magnesium, mg/L	0.5
Manganese, mg/L	<0.01
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L as N	2.2
Nitrite Nitrogen, mg/L as N	<0.5
Potassium, mg/L	2.0
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	91
Sulfate, mg/L	53
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	280
Cyanide, WAD, mg/L	0.021
Zinc, mg/L	<0.05
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 4.17 4.19 0.28

Remarks:

Analysis By: Eckert/Faulstich, M./Joyce/aqualab/Accu-Labs Date: 08/03/98

Approved By: Date: 08/03/98

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EPA Lab ID #NV004

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LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc.
Source: 2591 M-15 HG1-2 Comp III

Lab Report No.: 19782

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	0.73
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert

Date: 08/03/98

Approved By:

Date: 08/03/98

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CHEMAX Laboratories, Inc.

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EPA Lab ID #NV004

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LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19767
Account No.: MCCLD

Telephone: 356-1300

Fax: 356-8917

Work Authorized By: Gene M^{c} Clelland
Date Sampled: 06/30/98
Number of Samples: 3
Source: 2591 M-16 HG2-1
Chemax Control No. 98-4465 thru 4467

Date Submitted: 06/30/98
Sampled By: Client
Your Reference:

Notes: **PROFILE II**

Parameter	Results
pH	8.65
Alkalinity, mg/L as $CaCO_3$	47
Bicarbonate, mg/L	48
Aluminum, mg/L	0.06
Antimony, mg/L	<0.003
Arsenic, mg/L	0.014
Barium, mg/L	0.16
Beryllium, mg/L	<0.001
Boron, mg/L	0.10
Cadmium, mg/L	<0.003
Calcium, mg/L	2.3
Chloride, mg/L	44
Chromium, mg/L	<0.01
Copper, mg/L	<0.01

Remarks:

Analysis By: Faulstich, M./Joyce/aqualab

Date: 07/29/98

Approved By:

Date: 07/29/98

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CHEMAX Laboratories, Inc.
Analytical and Environmental Chemists
EPA Lab ID #NV004
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LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc. Lab Report No.: 19767
Source: 2591 M-16 HG2-1

Parameter	Results
Fluoride, mg/L	0.38
Iron, mg/L	<0.05
Lead, mg/L	<0.002
Magnesium, mg/L	<0.5
Manganese, mg/L	<0.01
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L	1.7
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	1.7
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	68
Sulfate, mg/L	30
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	130
Cyanide, WAD, mg/L	0.026
Zinc, mg/L	<0.05
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 3.12 2.95 2.7

Remarks:

Analysis By: Eckert/Faulstich, M./Joyce/aqualab/Accu-Labs Date: 07/29/98

Approved By: Date: 07/29/98

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Analytical and Environmental Chemists
EPA Lab ID #NV004

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LABORATORY REPORT

Report To: M[C] Clelland Laboratories, Inc.
Source: 2591 M-16 HG2-1

Lab Report No.: 19767

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	<0.5
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert

Date: 07/29/98

Approved By:

Date: 07/29/98

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EPA Lab ID #NV004

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LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19768
Account No.: MCCLD

Telephone: 356-1300

Fax: 356-8917

Work Authorized By: Gene M^{c} Clelland
Date Sampled: 06/30/98
Number of Samples: 3
Source: 2591 M-17 HG2-2
Chemax Control No. 98-4468 thru 4470

Date Submitted: 06/30/98
Sampled By: Client
Your Reference:

Notes: **PROFILE II**

Parameter	Results
pH	8.95
Alkalinity, mg/L as $CaCO_3$	74*
Bicarbonate, mg/L	76
Aluminum, mg/L	0.04
Antimony, mg/L	<0.003
Arsenic, mg/L	0.021
Barium, mg/L	0.16
Beryllium, mg/L	<0.001
Boron, mg/L	0.21
Cadmium, mg/L	<0.003
Calcium, mg/L	1.6
Chloride, mg/L	73
Chromium, mg/L	<0.01
Copper, mg/L	<0.01

Remarks: * For purpose of ion balance calculations, CO_3^{2-} = 7.2 mg/L.

Analysis By: Faulstich, M./Joyce/aqualab

Date: 07/29/98

Approved By:

Date: 07/29/98

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EPA Lab ID #NV004
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LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc. Lab Report No.: 19768
Source: 2591 M-17 HG2-2

Parameter	Results
Fluoride, mg/L	0.62
Iron, mg/L	<0.05
Lead, mg/L	<0.002
Magnesium, mg/L	<0.5
Manganese, mg/L	<0.01
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L as N	1.7
Nitrite Nitrogen, mg/L as N	<0.5
Potassium, mg/L	1.9
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	100
Sulfate, mg/L	44
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	200
Cyanide, WAD, mg/L	0.013
Zinc, mg/L	<0.05
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 4.57 4.61 0.47

Remarks:

Analysis By: Eckert/Faulstich, M./Joyce/aqualab/Accu-Labs Date: 07/29/98

Approved By: Date: 07/29/98

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CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

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LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc.
Source: 2591 M-17 HG2-2

Lab Report No.: 19768

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	<0.5
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert

Date: 07/29/98

Approved By:

Date: 07/29/98

992 Spice Islands Drive, Sparks, Nevada 89431 • P.O. Box 21122, Reno, Nevada 89515

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19845
Account No.: MCCLD

Telephone: 356-1300

Fax: 356-8917

Work Authorized By: Gene M^{c} Clelland
Date Sampled: 07/06/98
Number of Samples: 3
Source: 2591 M-18 H63-1
Sample ID: 5-807-021-04 thru -06

Date Submitted: 07/06/98
Sampled By: Client
Your Reference:

Notes: **PROFILE II**

Parameter	Results
pH	7.66
Alkalinity, mg/L as $CaCO_3$	100
Bicarbonate, mg/L	122
Aluminum, mg/L	1.2
Antimony, mg/L	<0.003
Arsenic, mg/L	0.096
Barium, mg/L	0.15
Beryllium, mg/L	<0.001
Boron, mg/L	0.20
Cadmium, mg/L	<0.002
Calcium, mg/L	5.1
Chloride, mg/L	10
Chromium, mg/L	<0.01
Copper, mg/L	0.01

Remarks:

Approved By:

Date: 08/20/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc. Lab Report No.: 19845
Source: 2591 M-18 H63-1

Parameter	Results
Fluoride, mg/L	0.57
Iron, mg/L	0.56
Lead, mg/L	0.003
Magnesium, mg/L	0.8
Manganese, mg/L	<0.01
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L	<1
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	1.9
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	65
Sulfate, mg/L	18
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	190
Cyanide, WAD, mg/L	<0.01
Zinc, mg/L	<0.05
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 3.20 2.67 8.7

Remarks:

Approved By:

Date: 08/20/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc. Lab Report No.: 19845
Source: 2591 M-18 H63-1

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	<0.5
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Approved By:

Date: 08/20/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{C} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19846
Account No.: MCCLD

Telephone: 356-1300

Fax: 356-8917

Work Authorized By: Gene M^{C} Clelland
Date Sampled: 07/06/98
Number of Samples: 3
Source: 2591 M-19 H63-2
Sample ID: 5-807-021-01 thru -03
Notes: **PROFILE II**

Date Submitted: 07/06/98
Sampled By: Client
Your Reference:

Parameter	Results
pH	7.51
Alkalinity, mg/L as $CaCO_3$	66
Bicarbonate, mg/L	80
Aluminum, mg/L	0.78
Antimony, mg/L	<0.003
Arsenic, mg/L	0.083
Barium, mg/L	0.19
Beryllium, mg/L	<0.001
Boron, mg/L	0.17
Cadmium, mg/L	<0.002
Calcium, mg/L	2.9
Chloride, mg/L	16
Chromium, mg/L	<0.01
Copper, mg/L	0.04

Remarks:

Approved By:

Date: 08/20/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc. Lab Report No.: 19846
Source: 2591 M-19 H63-2

Parameter	Results
Fluoride, mg/L	0.28
Iron, mg/L	0.39
Lead, mg/L	0.004
Magnesium, mg/L	0.7
Manganese, mg/L	0.01
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L	<1
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	2.0
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	48
Sulfate, mg/L	13
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	110
Cyanide, WAD, mg/L	<0.01
Zinc, mg/L	<0.05
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 2.34 2.05 6.7

Remarks:

Approved By:

Date: 08/20/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{C} Clelland Laboratories, Inc. Lab Report No.: 19846
Source: 2591 M-19 H63-2

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	<0.5
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Approved By:

Date: 08/20/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19862
Account No.: MCCLD

Telephone: 356-1300 Fax: 356-8917

Work Authorized By: Gene M^{c} Clelland
Date Sampled: 07/12/98
Number of Samples: 3
Source: 2591 M-20 HG 4 & 5-1
Sample ID: 5-807-040-01 thru -03

Date Submitted: 07/13/98
Sampled By: Client

Notes: **PROFILE II**

Parameter	Results
pH	8.21
Alkalinity, mg/L as $CaCO_3$	92
Bicarbonate, mg/L	112
Aluminum, mg/L	1.1
Antimony, mg/L	<0.003
Arsenic, mg/L	0.081
Barium, mg/L	0.17
Beryllium, mg/L	<0.001
Boron, mg/L	0.16
Cadmium, mg/L	<0.002
Calcium, mg/L	6.7
Chloride, mg/L	22
Chromium, mg/L	<0.01
Copper, mg/L	0.03

Remarks:

Approved By:

Date: 08/26/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc. Lab Report No.: 19862
Source: 2591 M-20 HG 4 & 5-1

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	<0.5
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert Date: 07/29/98

Approved By: Date: 08/26/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19863
Account No.: MCCLD

Telephone: 356-1300

Fax: 356-8917

Work Authorized By: Gene M^{c} Clelland
Date Sampled: 07/12/98
Number of Samples: 3
Source: 2591 M-21 HG 4 & 5-2
Sample ID: 5-807-040-04 thru -06

Date Submitted: 07/13/98
Sampled By: Client

Notes: **PROFILE II**

Parameter	Results
pH	8.58
Alkalinity, mg/L as $CaCO_3$	90
Bicarbonate, mg/L	110
Aluminum, mg/L	0.40
Antimony, mg/L	<0.003
Arsenic, mg/L	0.16
Barium, mg/L	0.16
Beryllium, mg/L	<0.001
Boron, mg/L	0.19
Cadmium, mg/L	<0.002
Calcium, mg/L	2.3
Chloride, mg/L	57
Chromium, mg/L	<0.01
Copper, mg/L	<0.01

Remarks:

Approved By:

Date: 08/26/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc. Lab Report No.: 19863
Source: 2591 M-21 HG 4 & 5-2

Parameter	Results
Fluoride, mg/L	0.58
Iron, mg/L	0.20
Lead, mg/L	<0.002
Magnesium, mg/L	<0.5
Manganese, mg/L	<0.01
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L	1.1
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	2.0
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	92
Sulfate, mg/L	31
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	500
Cyanide, WAD, mg/L	<0.01
Zinc, mg/L	<0.05
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 4.17 4.16 0.10

Remarks:

Approved By:

Date: 08/26/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc. Lab Report No.: 19863
Source: 2591 M-21 HG 4 & 5-2

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	<0.5
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert Date: 07/29/98

Approved By: Date: 08/26/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19864
Account No.: MCCLD

Telephone: 356-1300

Fax: 356-8917

Work Authorized By: Gene M^{c} Clelland
Date Sampled: 07/12/98
Number of Samples: 3
Source: 2591 M-22 HG 4 & 5-3
Sample ID: 5-807-040-07 thru -09

Date Submitted: 07/13/98
Sampled By: Client

Notes: **PROFILE II**

Parameter	Results
pH	8.21
Alkalinity, mg/L as $CaCO_3$	96
Bicarbonate, mg/L	117
Aluminum, mg/L	1.8
Antimony, mg/L	<0.003
Arsenic, mg/L	0.013
Barium, mg/L	0.18
Beryllium, mg/L	<0.001
Boron, mg/L	0.17
Cadmium, mg/L	<0.002
Calcium, mg/L	5.3
Chloride, mg/L	1.4
Chromium, mg/L	<0.01
Copper, mg/L	0.06

Remarks:

Approved By:

Date: 08/26/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc. Lab Report No.: 19864
Source: 2591 M-22 HG 4 & 5-3

Parameter	Results
Fluoride, mg/L	0.35
Iron, mg/L	0.99
Lead, mg/L	0.006
Magnesium, mg/L	1.5
Manganese, mg/L	0.03
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L	<1
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	2.3
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	37
Sulfate, mg/L	7.0
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	200
Cyanide, WAD, mg/L	<0.01
Zinc, mg/L	0.11
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 2.06 2.12 1.6

Remarks:

Approved By:

Date: 08/26/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
Source: 2591 M-22 HG 4 & 5-3

Lab Report No.: 19864

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	<0.5
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert

Date: 07/29/98

Approved By:

Date: 08/26/98

CHEMAX Laboratories, Inc.
Analytical and Environmental Chemists
EPA Lab ID #NV004
(702) 355-0202
Fax (702) 355-0817

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19726
Account No.: MCCLD

Telephone: 356-1300 Fax: 356-8917

Work Authorized By: Gene M^{c} Clelland
Date Sampled: 06/19/98 Date Submitted: 06/22/98
Number of Samples: 3 Sampled By: Client
Source: 2591 M-8 HG6-1 Comp III Your Reference:
Chemax Control No. 98-4262 thru 4264
Notes: **PROFILE II**

Parameter	Results
pH	7.06
Alkalinity, mg/L as $CaCO_3$	48
Bicarbonate, mg/L	59
Aluminum, mg/L	3.2
Antimony, mg/L	<0.003
Arsenic, mg/L	0.028
Barium, mg/L	0.23
Beryllium, mg/L	<0.001
Boron, mg/L	0.15
Cadmium, mg/L	<0.003
Calcium, mg/L	5.5
Chloride, mg/L	1.3
Chromium, mg/L	<0.01
Copper, mg/L	0.02

Remarks:

Analysis By: Faulstich, M./Joyce/aqualab Date: 07/24/98

Approved By: Date: 07/24/98

992 Spice Islands Drive, Sparks, Nevada 89431 • P.O. Box 21122, Reno, Nevada 89515

CHEMAX Laboratories, Inc.
Analytical and Environmental Chemists
EPA Lab ID #NV004
(702) 355-0202
Fax (702) 355-0817

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc. Lab Report No.: 19726
Source: 2591 M-8 HG6-1 Comp III

Parameter	Results
Fluoride, mg/L	0.32
Iron, mg/L	2.1
Lead, mg/L	0.019
Magnesium, mg/L	2.2
Manganese, mg/L	0.04
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L	<1
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	1.6
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	18
Sulfate, mg/L	8.0
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	67
Cyanide, WAD, mg/L	<0.005
Zinc, mg/L	0.06
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 1.28 1.19 3.7

Remarks:

Analysis By: Eckert/Faulstich, M./Joyce/aqualab/Accu-Labs Date: 07/24/98

Approved By: Date: 07/24/98

992 Spice Islands Drive, Sparks, Nevada 89431 • P.O. Box 21122, Reno, Nevada 89515

CHEMAX Laboratories, Inc.
Analytical and Environmental Chemists
EPA Lab ID #NV004
(702) 355-0202
Fax (702) 355-0817

LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc.
Source: 2591 M-8 HG6-1 Comp III

Lab Report No.: 19726

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	<0.5
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert
Date: 07/24/98

Approved By:
Date: 07/24/98

992 Spice Islands Drive, Sparks, Nevada 89431 • P.O. Box 21122, Reno, Nevada 89515

CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
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LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19727
Account No.: MCCLD

Telephone: 356-1300

Fax: 356-8917

Work Authorized By: Gene M^{c} Clelland
Date Sampled: 06/19/98
Number of Samples: 3
Source: 2591 M-9 HG6-2 Comp III
Chemax Control No. 98-4265 thru 4267
Notes: **PROFILE II**

Date Submitted: 06/22/98
Sampled By: Client
Your Reference:

Parameter	Results
pH	7.58
Alkalinity, mg/L as $CaCO_3$	45
Bicarbonate, mg/L	55
Aluminum, mg/L	0.82
Antimony, mg/L	<0.003
Arsenic, mg/L	0.039
Barium, mg/L	0.21
Beryllium, mg/L	<0.001
Boron, mg/L	0.12
Cadmium, mg/L	<0.003
Calcium, mg/L	4.5
Chloride, mg/L	1.2
Chromium, mg/L	<0.01
Copper, mg/L	0.02

Remarks:

Analysis By: Faulstich, M./Joyce/aqualab

Date: 07/24/98

Approved By:

Date: 07/24/98

992 Spice Islands Drive, Sparks, Nevada 89431 • P.O. Box 21122, Reno, Nevada 89515

CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
Fax (702) 355-0817

LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc.
Source: 2591 M-9 HG6-2 Comp III

Lab Report No.: 19727

Parameter	Results
Fluoride, mg/L	0.27
Iron, mg/L	0.53
Lead, mg/L	0.005
Magnesium, mg/L	1.1
Manganese, mg/L	0.01
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L	<1
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	1.0
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	17
Sulfate, mg/L	7.0
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	60
Cyanide, WAD, mg/L	<0.005
Zinc, mg/L	<0.05
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 1.08 1.10 0.69

Remarks:

Analysis By: Eckert/Faulstich, M./Joyce/aqualab/Accu-Labs

Date: 07/24/98

Approved By:

Date: 07/24/98

992 Spice Islands Drive, Sparks, Nevada 89431 • P.O. Box 21122, Reno, Nevada 89515

CHEMAX Laboratories, Inc.
Analytical and Environmental Chemists
EPA Lab ID #NV004
(702) 355-0202
Fax (702) 355-0817

LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc.
Source: 2591 M-9 HG6-2 Comp III
Lab Report No.: 19727

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	<0.5
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert
Date: 07/24/98

Approved By:
Date: 07/24/98

992 Spice Islands Drive, Sparks, Nevada 89431 • P.O. Box 21122, Reno, Nevada 89515

CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
Fax (702) 355-0817

LABORATORY REPORT

Report To: M^{C} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19778
Account No.: MCCLD

Telephone: 356-1300

Fax: 356-8917

Work Authorized By: Gene M^{C} Clelland
Date Sampled: 06/23/98
Number of Samples: 3
Source: 2591 M-11 HG7-1
Chemax Control No. 98-4337 thru 4339
Notes: **PROFILE II**

Date Submitted: 06/24/98
Sampled By: Client
Your Reference:

Parameter	Results
pH	8.69
Alkalinity, mg/L as $CaCO_3$	66*
Bicarbonate, mg/L	71
Aluminum, mg/L	2.3
Antimony, mg/L	<0.003
Arsenic, mg/L	0.056
Barium, mg/L	0.28
Beryllium, mg/L	<0.001
Boron, mg/L	0.33
Cadmium, mg/L	<0.003
Calcium, mg/L	7.4
Chloride, mg/L	77
Chromium, mg/L	<0.01
Copper, mg/L	0.01

Remarks: * For purpose of ion balance calculations, CO_3^{2-} = 4.8 mg/L.

Analysis By: Faulstich, M./Joyce/aqualab

Date: 08/03/98

Approved By:

Date: 08/03/98

992 Spice Islands Drive, Sparks, Nevada 89431 • P.O. Box 21122, Reno, Nevada 89515

CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
Fax (702) 355-0817

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
Source: 2591 M-11 HG7-1

Lab Report No.: 19778

Parameter	Results
Fluoride, mg/L	0.82
Iron, mg/L	1.1
Lead, mg/L	0.018
Magnesium, mg/L	1.9
Manganese, mg/L	0.02
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L	4.6
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	3.5
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	110
Sulfate, mg/L	42
Thallium, mg/L	0.001
Total Dissolved Solids, mg/L	350
Cyanide, WAD, mg/L	0.051
Zinc, mg/L	0.08
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 5.18 4.74 4.5

Remarks:

Analysis By: Eckert/Faulstich, M./Joyce/aqualab/Accu-Labs

Date: 08/03/98

Approved By:

Date: 08/03/98

992 Spice Islands Drive, Sparks, Nevada 89431 • P.O. Box 21122, Reno, Nevada 89515

CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
Fax (702) 355-0817

LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc.
Source: 2591 M-11 HG7-1

Lab Report No.: 19778

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	0.80
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert

Date: 08/03/98

Approved By:

Date: 08/03/98

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CHEMAX Laboratories, Inc.
Analytical and Environmental Chemists
EPA Lab ID #NV004
(702) 355-0202
Fax (702) 355-0817

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19728
Account No.: MCCLD

Telephone: 356-1300

Fax: 356-8917

Work Authorized By: Gene M^{c} Clelland
Date Sampled: 06/19/98
Number of Samples: 3
Source: 2591 M-10 HG7-2 Comp III
Chemax Control No. 98-4268 thru 4270
Notes: **PROFILE II**

Date Submitted: 06/22/98
Sampled By: Client
Your Reference:

Parameter	Results
pH	7.80
Alkalinity, mg/L as $CaCO_3$	50
Bicarbonate, mg/L	61
Aluminum, mg/L	0.52
Antimony, mg/L	<0.003
Arsenic, mg/L	0.022
Barium, mg/L	0.13
Beryllium, mg/L	<0.001
Boron, mg/L	0.09
Cadmium, mg/L	<0.003
Calcium, mg/L	4.3
Chloride, mg/L	35
Chromium, mg/L	<0.01
Copper, mg/L	<0.01

Remarks:

Analysis By: Faulstich, M./Joyce/aqualab
Date: 07/24/98

Approved By:
Date: 07/24/98

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Analytical and Environmental Chemists
EPA Lab ID #NV004
(702) 355-0202
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LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
Source: 2591 M-10 HG7-2 Comp III
Lab Report No.: 19728

Parameter	Results
Fluoride, mg/L	0.40
Iron, mg/L	0.07
Lead, mg/L	<0.002
Magnesium, mg/L	0.80
Manganese, mg/L	<0.01
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L	1.7
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	1.3
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	60
Sulfate, mg/L	87
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	260
Cyanide, WAD, mg/L	0.030
Zinc, mg/L	<0.05
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 2.98 3.94 14

Remarks:

Analysis By: Eckert/Faulstich, M./Joyce/aqualab/Accu-Labs
Date: 07/24/98

Approved By:
Date: 07/24/98

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CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists

EPA Lab ID #NV004

(702) 355-0202
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LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc.
Source: 2591 M-10 HG7-2 Comp III

Lab Report No.: 19728

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	0.96
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert

Date: 07/24/98

Approved By:

Date: 07/24/98

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CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

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Fax (702) 355-0817

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19779
Account No.: MCCLD

Telephone: 356-1300 Fax: 356-8917

Work Authorized By: Gene M^{c} Clelland
Date Sampled: 06/23/98 Date Submitted: 06/24/98
Number of Samples: 3 Sampled By: Client
Source: 2591 M-12 HG7-3 Comp III Your Reference:
Chemax Control No. 98-4340 thru 4342
Notes: **PROFILE II**

Parameter	Results
pH	8.92
Alkalinity, mg/L as $CaCO_3$	65*
Bicarbonate, mg/L	62
Aluminum, mg/L	2.9
Antimony, mg/L	<0.003
Arsenic, mg/L	0.19
Barium, mg/L	0.24
Beryllium, mg/L	<0.001
Boron, mg/L	0.19
Cadmium, mg/L	<0.003
Calcium, mg/L	6.7
Chloride, mg/L	46
Chromium, mg/L	<0.01
Copper, mg/L	0.01

Remarks: * For purpose of ion balance calculations, CO_3^{2-} = 8.4 mg/L.

Analysis By: Faulstich, M./Joyce/aqualab Date: 08/03/98

Approved By: Date: 08/03/98

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CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

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LABORATORY REPORT

Report To: M^{C} Clelland Laboratories, Inc.
Source: 2591 M-12 HG7-3 Comp III

Lab Report No.: 19779

Parameter	Results
Fluoride, mg/L	0.66
Iron, mg/L	0.86
Lead, mg/L	0.011
Magnesium, mg/L	1.7
Manganese, mg/L	0.03
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L	1.3
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	2.2
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	70
Sulfate, mg/L	32
Thallium, mg/L	0.001
Total Dissolved Solids, mg/L	290
Cyanide, WAD, mg/L	0.031
Zinc, mg/L	0.06
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 3.58 3.38 2.7

Remarks:

Analysis By: Eckert/Faulstich, M./Joyce/aqualab/Accu-Labs

Date: 08/03/98

Approved By:

Date: 08/03/98

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CHEMAX Laboratories, Inc.
Analytical and Environmental Chemists
EPA Lab ID #NV004
(702) 355-0202
Fax (702) 355-0817

LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc.
Source: 2591 M-12 HG7-3 Comp III

Lab Report No.: 19779

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	<0.5
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert
Date: 08/03/98

Approved By:
Date: 08/03/98

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CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

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LABORATORY REPORT

Report To: M^{C} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19780
Account No.: MCCLD

Telephone: 356-1300 Fax: 356-8917

Work Authorized By: Gene M^{C} Clelland
Date Sampled: 06/23/98 Date Submitted: 06/24/98
Number of Samples: 3 Sampled By: Client
Source: 2591 M-13 HG7-4 Comp III Your Reference:
Chemax Control No. 98-4343 thru 4345
Notes: **PROFILE II**

Parameter	Results
pH	8.36
Alkalinity, mg/L as $CaCO_3$	44
Bicarbonate, mg/L	51
Aluminum, mg/L	0.16
Antimony, mg/L	<0.003
Arsenic, mg/L	0.055
Barium, mg/L	0.19
Beryllium, mg/L	<0.001
Boron, mg/L	0.09
Cadmium, mg/L	<0.003
Calcium, mg/L	3.3
Chloride, mg/L	95
Chromium, mg/L	<0.01
Copper, mg/L	<0.01

Remarks: * For purpose of ion balance calculations, CO_3^{2-} = 1.2 mg/L.

Analysis By: Faulstich, M./Joyce/aqualab Date: 08/03/98

Approved By: Date: 08/03/98

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CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
Fax (702) 355-0817

LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc.
Source: 2591 M-13 HG7-4 Comp III

Lab Report No.: 19780

Parameter	Results
Fluoride, mg/L	0.58
Iron, mg/L	0.11
Lead, mg/L	<0.002
Magnesium, mg/L	0.7
Manganese, mg/L	<0.01
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L	5.1
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	2.0
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	110
Sulfate, mg/L	80
Thallium, mg/L	0.001
Total Dissolved Solids, mg/L	370
Cyanide, WAD, mg/L	0.044
Zinc, mg/L	<0.05
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 5.19 5.61 3.9

Remarks:

Analysis By: Eckert/Faulstich, M./Joyce/aqualab/Accu-Labs

Date: 08/03/98

Approved By:

Date: 08/03/98

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CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

(702) 355-0202
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LABORATORY REPORT

Report To: M^{C} Clelland Laboratories, Inc.
Source: 2591 M-13 HG7-4 Comp III

Lab Report No.: 19780

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	0.73
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert

Date: 08/03/98

Approved By:

Date: 08/03/98

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CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

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LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19776
Account No.: MCCLD

Telephone: 356-1300

Fax: 356-8917

Work Authorized By: Gene M^{c} Clelland
Date Sampled: 06/18/98
Number of Samples: 13
Source: Job 2591
Chemax Control No. 98-4239 thru 4251

Date Submitted: 06/19/98
Sampled By: Client
Your Reference:

Sample ID	Results	
	Cyanide, WAD, mg/kg	Moisture, %
LG1 Comp.	<0.05	2.1
LG2-1	0.30	3.5
LG2-2	<0.05	5.3
LG2-3	<0.05	6.0
LG3-1	<0.05	5.4
LG3-2	<0.05	6.1
LG3-3	2.6	4.2
HG6-1	<0.05	3.2
HG6-2	<0.05	3.3
HG7-1	0.52	6.4
HG7-2	0.30	3.1
HG7-3	<0.05	1.4
HG7-4	0.30	3.8

Remarks: Results moisture-corrected to dry weight basis.

Analysis By: Accu-Labs/Eckert

Date: 07/29/98

Approved By:

Date: 07/29/98

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CHEMAX Laboratories, Inc.
Analytical and Environmental Chemists
EPA Lab ID #NV004
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Fax (702) 355-0817

LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19689
Account No.: MCCLD

Telephone: 356-1300

Fax: 356-8917

Work Authorized By: Gene M^C Clelland
Date Sampled: 06/24/98
Number of Samples: 9
Source: Job 2591
Chemax Control No. 98-4352 thru 4360
Notes:

Date Submitted: 06/25/98
Sampled By: Client
Your Reference:

Sample ID	Results	
	Cyanide, WAD, mg/kg	Moisture, %
HG1-1	0.41	7.0
HG1-2	0.73	7.4
HG2-1	0.49	7.0
HG2-2	0.43	7.5
HG3-1	<0.05	5.8
HG3-2	0.34	5.2
HG4&5-1	0.34	5.7
HG4&5-2	0.32	5.8
HG4&5-3	<0.05	5.5

Remarks: Results moisture-corrected to dry weight basis.

Analysis By: Accu-Labs/Eckert

Date: 07/29/98

Approved By:

Date: 07/29/98

992 Spice Islands Drive, Sparks, Nevada 89431 • P.O. Box 21122, Reno, Nevada 89515

CHEMAX Laboratories, Inc.

Analytical and Environmental Chemists
EPA Lab ID #NV004

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Fax (702) 355-0817

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19756
Account No.: MCCLD

Telephone: 356-1300

Fax: 356-8917

Work Authorized By: Gene M^{c} Clelland
Date Sampled: 07/06/98
Number of Samples: 2
Source: Job 2591
Chemax Control No. 5-807-020-01 & -02
Notes:

Date Submitted: 07/06/98
Sampled By: Client
Your Reference:

Sample ID	Cyanide, WAD, mg/kg
M-27 Drum Mine Preg Pond	<0.2
M-28 Drum Mine Barren Pond	110

Remarks:

Analysis By: Accu-Labs

Date: 07/29/98

Approved By:

Date: 07/29/98

992 Spice Islands Drive, Sparks, Nevada 89431 • P.O. Box 21122, Reno, Nevada 89515

Laboratory Analysis Report

Sierra Environmental Monitoring, Inc.

MCCLELLAND LABORATORIES
CLAYTON CHAPPELL
1016 GREG STREET
SPARKS NV 89431

Date : 8/07/98
Client : MLI-576
Taken by: CLIENT
Report : 24471
PO# :

Sample	Collected Date	Time	NEUTRALIZATION POT. TONS/1000T	ACID GEN. POTENTIAL TONS/1000T	ACID GEN. S POTEN. SULFIDE TONS/1000T	PH-SATUR PASTE S.U.	SULFUR, TOTAL LECO FURNACE % S	SULFUR, SO4 SULFATE % S
2591 - HG1-1	7/10/98	:	103	2.2	<0.3	8.86	0.07	0.07
2591 - HG1-2	7/10/98	:	277	5.6	<0.3	8.52	0.18	0.18
2591 - HG2-1	7/10/98	:	178	13	<0.3	8.51	0.41	0.41
2591 - HG2-2	7/10/98	:	99	6.3	<0.3	8.76	0.20	0.20
2591 - HG3-1	7/10/98	:	23	8.1	1.3	8.69	0.26	0.22
2591 - HG3-2	7/10/98	:	12	9.1	1.6	8.79	0.29	0.23
2591 - HG4 & 5-1	7/10/98	:	7	4.7	<0.3	8.57	0.15	0.15
2591 - HG4 & 5-2	7/10/98	:	50	7.2	<0.3	8.65	0.23	0.23
2591 - HG4 & 5-3	7/10/98	:	29	13	<0.3	9.07	0.40	0.40
2591 - HG6-1	7/10/98	:	3	1.3	<0.3	8.45	0.04	0.04
2591 - HG6-2	7/10/98	:	7	5.0	<0.3	8.08	0.16	0.16
2591 - HG7-1	7/10/98	:	38	16	<0.3	8.58	0.50	0.50
2591 - HG7-2	7/10/98	:	52	14	<0.3	8.39	0.44	0.44
2591 - HG7-3	7/10/98	:	48	6.9	<0.3	8.84	0.22	0.22
2591 - HG7-4	7/10/98	:	16	28	3.4	8.00	0.90	0.80
2591 - LG2-1	7/10/98	:	10	25	5.0	8.29	0.80	0.64
2591 - LG2-2	7/10/98	:	49	12	<0.3	8.16	0.39	0.39
2591 - LG2-3	7/10/98	:	<1	32	8.4	7.38	1.0	0.76
2591 - LG3-1	7/10/98	:	50	26	10	8.28	0.83	0.51
2591 - LG3-2	7/10/98	:	59	11	<0.3	8.03	0.36	0.36
2591 - LG3-3	7/10/98	:	57	4.1	<0.3	8.50	0.13	0.13
2591 - W1 COMP I	7/10/98	:	332	15	0.3	7.22	0.49	0.48
2591 - W2 COMP I	7/10/98	:	706	2.5	<0.3	8.10	0.08	0.08
2591 - W3 COMP I	7/10/98	:	64	11	<0.3	7.84	0.35	0.35
2591 - W7 COMP I	7/10/98	:	144	60	29	7.28	1.9	1.0
2591 - LG1 COMP	7/10/98	:	90	13	<0.3	8.08	0.42	0.42

Sample	Collected Date	Time	SULFUR, S= SULFIDE % S
2591 - HG1-1	7/10/98	:	<0.01
2591 - HG1-2	7/10/98	:	<0.01
2591 - HG2-1	7/10/98	:	<0.01
2591 - HG2-2	7/10/98	:	<0.01
2591 - HG3-1	7/10/98	:	0.04

Continued on Next Page

Approved By:

William F. Pillsbury
President

1135 Financial Blvd.
Reno, NV 89502
Phone (702) 857-2400
FAX (702) 857-2404
sem@powernet.net

John Kobza, Ph.D.
John C. Seher
Managers

Laboratory Analysis Report

Sierra Environmental Monitoring, Inc.

MCCLELLAND LABORATORIES
CLAYTON CHAPPELL
1016 GREG STREET
SPARKS NV 89431

Date : 8/07/98
Client : MLI-576
Taken by: CLIENT
Report : 24471
PO# :

Sample	Collected Date	Time	SULFUR, S= SULFIDE % S
2591 - HG3-2	7/10/98	:	0.05
2591 - HG4 & 5-1	7/10/98	:	<0.01
2591 - HG4 & 5-2	7/10/98	:	<0.01
2591 - HG4 & 5-3	7/10/98	:	<0.01
2591 - HG6-1	7/10/98	:	<0.01
2591 - HG6-2	7/10/98	:	<0.01
2591 - HG7-1	7/10/98	:	<0.01
2591 - HG7-2	7/10/98	:	<0.01
2591 - HG7-3	7/10/98	:	<0.01
2591 - HG7-4	7/10/98	:	0.11
2591 - LG2-1	7/10/98	:	0.16
2591 - LG2-2	7/10/98	:	<0.01
2591 - LG2-3	7/10/98	:	0.27
2591 - LG3-1	7/10/98	:	0.32
2591 - LG3-2	7/10/98	:	<0.01
2591 - LG3-3	7/10/98	:	<0.01
2591 - W1 COMP I	7/10/98	:	0.01
2591 - W2 COMP I	7/10/98	:	<0.01
2591 - W3 COMP I	7/10/98	:	<0.01
2591 - W7 COMP I	7/10/98	:	0.92
2591 - LG1 COMP	7/10/98	:	<0.01

Approved By: _____

William F. Pillsbury
President

1135 Financial Blvd.
Reno, NV 89502
Phone (702) 857-2400
FAX (702) 857-2404
sem@powernet.net

John Kobza, Ph.D.
John C. Seher
Managers

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19839
Account No.: MCCLD

Telephone: 356-1300 Fax: 356-8917

Work Authorized By: Gene M^{c} Clelland
Date Sampled: 07/09/98 Date Submitted: 07/09/98
Number of Samples: 3 Sampled By: Client
Source: 2591 M-27 Drum Mine Preg Pond
Sample ID: 5-807-035-04 thru -06
Notes: **PROFILE II**

Parameter	Results
pH	8.29
Alkalinity, mg/L as $CaCO_3$	358
Bicarbonate, mg/L	437
Aluminum, mg/L	0.073
Antimony, mg/L	<0.003
Arsenic, mg/L	0.080
Barium, mg/L	0.05
Beryllium, mg/L	<0.001
Boron, mg/L	0.46
Cadmium, mg/L	<0.002
Calcium, mg/L	14
Chloride, mg/L	325
Chromium, mg/L	<0.01
Copper, mg/L	0.02

Remarks:

Approved By:

Date: 08/26/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{C} Clelland Laboratories, Inc. Lab Report No.: 19839
Source: 2591 M-27 Drum Mine Preg Pond

Parameter	Results
Fluoride, mg/L	0.98
Iron, mg/L	<0.05
Lead, mg/L	<0.002
Magnesium, mg/L	8.6
Manganese, mg/L	0.18
Mercury, mg/L	<0.0002
Nickel, mg/L	0.01
Nitrate Nitrogen, mg/L	<1
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	15
Selenium, mg/L	0.011
Silver, mg/L	<0.01
Sodium, mg/L	930
Sulfate, mg/L	800
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	1,940
Cyanide, WAD, mg/L	<0.01
Zinc, mg/L	<0.05
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 42.2 33.0 12.3

Remarks:

Approved By:

Date: 08/26/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc. Lab Report No.: 19839
Source: 2591 M-27 Drum Mine Preg Pond

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	<0.5
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert Date: 07/10/98

Approved By: Date: 08/26/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19840
Account No.: MCCLD

Telephone: 356-1300 Fax: 356-8917

Work Authorized By: Gene M^{c} Clelland
Date Sampled: 07/09/98 Date Submitted: 07/09/98
Number of Samples: 3 Sampled By: Client
Source: 2591 M-28 Drum Mine Barren Pond
Sample ID: 5-807-035-07 thru -09
Notes: **PROFILE II**

Parameter	Results
pH	12.09
Alkalinity, mg/L as $CaCO_3$	1900*
Bicarbonate, mg/L	0
Aluminum, mg/L	<0.025
Antimony, mg/L	<0.003
Arsenic, mg/L	<0.005
Barium, mg/L	0.14
Beryllium, mg/L	<0.001
Boron, mg/L	4.9
Cadmium, mg/L	<0.002
Calcium, mg/L	700
Chloride, mg/L	365
Chromium, mg/L	<0.01
Copper, mg/L	0.32

Remarks: * For purpose of ion balance calculations, CO_3^{2-} = 84 mg/L and OH^- = 599 mg/L.

Approved By:

Date: 08/26/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{C} Clelland Laboratories, Inc. Lab Report No.: 19840
Source: 2591 M-28 Drum Mine Barren Pond

Parameter	Results
Fluoride, mg/L	1.9
Iron, mg/L	<0.05
Lead, mg/L	<0.002
Magnesium, mg/L	<25*
Manganese, mg/L	<0.01
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L	<1
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	29
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	420
Sulfate, mg/L	800
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	1,940
Cyanide, WAD, mg/L	0.042
Zinc, mg/L	<0.05
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 56.0 51.5 4.2

Remarks: * Due to matrix interference, sample was run at 1/100 dilution, hence the elevated reporting limit.

Approved By:

Date: 08/26/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc. Lab Report No.: 19840
Source: 2591 M-28 Drum Mine Barren Pond

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	<0.5
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert Date: 07/10/98

Approved By: Date: 08/26/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19818
Account No.: MCCLD

Telephone: 356-1300 Fax: 356-8917

Work Authorized By: Gene M^{c} Clelland
Date Sampled: 07/07/98
Number of Samples: 3
Source: 2591 M-25 Perimeter HG-1
Sample ID: 5-807-029-07 thru -09
Notes: **PROFILE II**

Date Submitted: 07/07/98
Sampled By: Client
Your Reference:

Parameter	Results
pH	8.07
Alkalinity, mg/L as $CaCO_3$	142
Bicarbonate, mg/L	173
Aluminum, mg/L	0.53
Antimony, mg/L	<0.003
Arsenic, mg/L	<0.005
Barium, mg/L	0.15
Beryllium, mg/L	<0.001
Boron, mg/L	2.1
Cadmium, mg/L	<0.003
Calcium, mg/L	580
Chloride, mg/L	2,130
Chromium, mg/L	<0.01
Copper, mg/L	<0.01

Remarks:

Analysis By: Faulstich, M./Joyce/aqualab Date: 08/11/98

Approved By: Date: 08/11/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

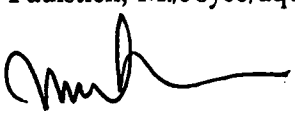
LABORATORY REPORT

Report To: M^C Clelland Laboratories, Inc. Lab Report No.: 19818
Source: 2591 M-25 Perimeter HG-1

Parameter	Results
Fluoride, mg/L	1.8
Iron, mg/L	<0.05
Lead, mg/L	<0.002
Magnesium, mg/L	75
Manganese, mg/L	<0.01
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L	30
Nitrite Nitrogen, mg/L	<62.5*
Potassium, mg/L	28
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	170
Sulfate, mg/L	1,940
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	6,600
Cyanide, WAD, mg/L	0.072
Zinc, mg/L	<0.05
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 110 105 2.0

Remarks: * High reporting limit on Nitrite Nitrogen due to large Chloride peak on ion chromatogram.

Analysis By: Faulstich, M./Joyce/aqualab/Accu-Labs Date: 08/11/98

Approved By:  Date: 08/11/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc. Lab Report No.: 19818
Source: 2591 M-25 Perimeter HG-1

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	0.84
Scandium, mg/L	<0.5
Strontium, mg/L	6.4
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert Date: 08/11/98

Approved By: Date: 08/11/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19817
Account No.: MCCLD

Telephone: 356-1300 Fax: 356-8917

Work Authorized By: Gene M^{c} Clelland
Date Sampled: 07/07/98 Date Submitted: 07/07/98
Number of Samples: 3 Sampled By: Client
Source: 2591 M-24 Perimeter HG-2 Your Reference:
Sample ID: 5-807-029-04 thru -06
Notes: **PROFILE II**

Parameter	Results
pH	8.36
Alkalinity, mg/L as $CaCO_3$	165
Bicarbonate, mg/L	189
Aluminum, mg/L	0.35
Antimony, mg/L	<0.003
Arsenic, mg/L	<0.005
Barium, mg/L	0.06
Beryllium, mg/L	<0.001
Boron, mg/L	2.2
Cadmium, mg/L	<0.003
Calcium, mg/L	140
Chloride, mg/L	180
Chromium, mg/L	<0.01
Copper, mg/L	0.01

Remarks:

Analysis By: Faulstich, M./Joyce/aqualab Date: 08/11/98

Approved By: Date: 08/11/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

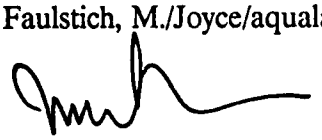
LABORATORY REPORT

Report To: M^{C} Clelland Laboratories, Inc. Lab Report No.: 19817
Source: 2591 M-24 Perimeter HG-2

Parameter	Results
Fluoride, mg/L	1.5
Iron, mg/L	<0.05
Lead, mg/L	<0.002
Magnesium, mg/L	12
Manganese, mg/L	<0.01
Mercury, mg/L	<0.0002
Nickel, mg/L	0.02
Nitrate Nitrogen, mg/L	12
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	23
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	840
Sulfate, mg/L	1,930
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	3,380
Cyanide, WAD, mg/L	<0.005
Zinc, mg/L	<0.05
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 45.0 49.4 4.8

Remarks: * High reporting limit on Nitrite Nitrogen due to large Chloride peak on ion chromatogram.

Analysis By: Faulstich, M./Joyce/aqualab/Accu-Labs Date: 08/11/98

Approved By:  Date: 08/11/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc. Lab Report No.: 19817
Source: 2591 M-24 Perimeter HG-2

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	0.77
Scandium, mg/L	<0.5
Strontium, mg/L	1.7
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert Date: 08/11/98

Approved By: Date: 08/11/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19816
Account No.: MCCLD

Telephone: 356-1300 Fax: 356-8917

Work Authorized By: Gene M^{c} Clelland
Date Sampled: 07/07/98
Number of Samples: 3
Source: 2591 M-23 Perimeter HG-3
Sample ID: 5-807-029-01 thru -03
Notes: **PROFILE II**

Date Submitted: 07/07/98
Sampled By: Client
Your Reference:

Parameter	Results
pH	8.18
Alkalinity, mg/L as $CaCO_3$	173
Bicarbonate, mg/L	211
Aluminum, mg/L	0.50
Antimony, mg/L	<0.003
Arsenic, mg/L	0.029
Barium, mg/L	0.08
Beryllium, mg/L	<0.001
Boron, mg/L	1.4
Cadmium, mg/L	<0.003
Calcium, mg/L	250
Chloride, mg/L	1,215
Chromium, mg/L	<0.01
Copper, mg/L	0.02

Remarks:

Analysis By: Faulstich, M./Joyce/aqualab Date: 08/11/98

Approved By: Date: 08/11/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc. Lab Report No.: 19816
Source: 2591 M-23 Perimeter HG-3

Parameter	Results
Fluoride, mg/L	0.56
Iron, mg/L	<0.05
Lead, mg/L	<0.002
Magnesium, mg/L	39
Manganese, mg/L	<0.01
Mercury, mg/L	<0.0002
Nickel, mg/L	0.04
Nitrate Nitrogen, mg/L	<1
Nitrite Nitrogen, mg/L	<62.5*
Potassium, mg/L	10
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	860
Sulfate, mg/L	780
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	3,410
Cyanide, WAD, mg/L	0.010
Zinc, mg/L	<0.05
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 53.5 53.9 0.35

Remarks: * High reporting limit on Nitrite Nitrogen due to large Chloride peak on ion chromatogram.

Analysis By: Faulstich, M./Joyce/aqualab/Accu-Labs Date: 08/11/98

Approved By: Date: 08/11/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc. Lab Report No.: 19816
Source: 2591 M-23 Perimeter HG-3

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	<0.5
Scandium, mg/L	<0.5
Strontium, mg/L	2.8
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert Date: 08/11/98

Approved By: Date: 08/11/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
1016 Greg Street
Sparks, NV 89431

Lab Report No.: 19838
Account No.: MCCLD

Telephone: 356-1300 Fax: 356-8917

Work Authorized By: Gene M^{c} Clelland
Date Sampled: 07/09/98 Date Submitted: 07/09/98
Number of Samples: 3 Sampled By: Client
Source: 2591 M-26 Perimeter HG-6 Your Reference:
Sample ID: 5-807-035-01 thru -03
Notes: **PROFILE II**

Parameter	Results
pH	8.38
Alkalinity, mg/L as $CaCO_3$	140
Bicarbonate, mg/L	171
Aluminum, mg/L	<0.025
Antimony, mg/L	<0.003
Arsenic, mg/L	0.054
Barium, mg/L	0.03
Beryllium, mg/L	<0.001
Boron, mg/L	0.30
Cadmium, mg/L	<0.003
Calcium, mg/L	9.0
Chloride, mg/L	130
Chromium, mg/L	<0.01
Copper, mg/L	0.01

Remarks:

Approved By:

Date: 08/22/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc. Lab Report No.: 19838
Source: 2591 M-26 Perimeter HG-6

Parameter	Results
Fluoride, mg/L	0.69
Iron, mg/L	<0.05
Lead, mg/L	<0.002
Magnesium, mg/L	1.0
Manganese, mg/L	<0.01
Mercury, mg/L	<0.0002
Nickel, mg/L	<0.01
Nitrate Nitrogen, mg/L	1.2
Nitrite Nitrogen, mg/L	<0.5
Potassium, mg/L	13
Selenium, mg/L	<0.005
Silver, mg/L	<0.01
Sodium, mg/L	78
Sulfate, mg/L	100
Thallium, mg/L	<0.001
Total Dissolved Solids, mg/L	430
Cyanide, WAD, mg/L	0.012
Zinc, mg/L	<0.05
Cation-Anion Balance: Cations, meq/L Anions, meq/L % Error	 9.18 8.59 3.3

Remarks:

Approved By: Date: 09/22/98

Acculabs Inc.

Sparks/Reno 992 Spice Islands Drive, Sparks NV 89431 ■ 702-355-0202 ■ Fax 355-0817

EPA Lab ID #NV004

LABORATORY REPORT

Report To: M^{c} Clelland Laboratories, Inc.
Source: 2591 M-26 Perimeter HG-6

Lab Report No.: 19838

Parameter	Results
11-Element Semi-Quantitative ICP Scan	
Bismuth, mg/L	<0.5
Cobalt, mg/L	<0.5
Gallium, mg/L	<0.5
Lithium, mg/L	<0.5
Molybdenum, mg/L	<0.25
Phosphorus, mg/L	0.98
Scandium, mg/L	<0.5
Strontium, mg/L	<0.5
Tin, mg/L	<0.5
Titanium, mg/L	<0.1
Vanadium, mg/L	<0.15

Remarks:

Analysis By: Eckert

Date: 07/10/98

Approved By:

Date: 08/22/98

McClelland Laboratories -Summary of Hydraulic Conductivity Testing

Sample	Initial Moisture, %	Final Moisture, %	Initial Dry Density, pcf	Final Dry Density, pcf	Final Porosity	Hydraulic Conductivity, cm/sec
HG4&5-2 Composite	5.1	10.4	82.0	103.3	0.335	$5.5x10^{-2}$
HG4&5-2 Composite	5.1	7.7	82.2	97.8	0.353	$1.1x10^{-1}$
HG4&5-3 Composite	4.4	7.6	81.3	98.8	0.361	$1.6x10^{-1}$
HG6-1	2.6	11.9	85.6	98.0	0.365	$9.0x10^{-2}$
HG3-2 Composite	3.3	8.1	84.1	96.9	0.374	$9.5x10^{-2}$
HG3-1	6.3	9.6	78.0	96.3	0.368	$1.8x10^{-2}$
HG6-2 Composite	3.1	14.4	87.6	113.9	0.266	$8.0x10^{-2}$
HG7-1 Composite III	4.5	7.1	89.8	102.8	0.332	$7.8x10^{-2}$
HG7-2 Composite	4.2	12.7	89.9	111.9	0.226	$6.3x10^{-2}$
HG7-3 Composite	1.8	11.2	90.0	109.5	0.309	$1.6x10^{-1}$
HG7-4 Composite III	4.4	13.6	85.0	107.2	0.280	$2.0x10^{-2}$
LG1 Composite	2.7	12.8	86.5	106.3	0.301	$1.5x10^{-1}$

Sample	Initial Moisture, %	Final Moisture, %	Initial Dry Density, pcf	Final Dry Density, pcf	Final Porosity	Hydraulic Conductivity, cm/sec
LG2-1 Composite	1.5	11.4	86.0	104.0	0.320	1.5×10^{-1}
LG2-2 Composite	2.7	13.0	87.4	109.3	0.234	2.2×10^{-2}
LG2-3 Composite	5.8	16.1	78.2	87.2	0.419	5.1×10^{-2}
LG3-1 Composite	5.7	12.3	78.8	86.9	0.410	1.7×10^{-1}
LG3-2 Composite	7.0	14.4	79.7	104.5	0.310	1.1×10^{-2}
LG3-3 Composite	4.9	12.1	82.8	104.5	0.310	1.3×10^{-1}

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McClelland Laboratories -Summary of Drained Down Moisture Contnet

Sample	Final Moisture, gravimetric,%	Final Dry Density, pcf	Final Void Ratio	Final Porosity	Final Saturation, %	Final Moisture, volumetric
HG4&5-2 Composite	10.4	103.3	0.503	0.335	51	0.172
HG4&5-1 Composite	7.7	97.8	0.546	0.353	34	0.121
HG4&5-3 Composite	7.6	98.8	0.566	0.361	33	0.120
HG6-1	11.9	98.0	0.575	0.365	51	0.187
HG3-2 Composite	8.1	96.9	0.605	0.374	33	0.126
HG3-1	9.6	96.3	0.581	0.368	40	0.148
HG6-2 Composite	14.4	113.9	0.362	0.266	99	0.262
HG7-1 Composite III	7.1	102.8	0.496	0.332	35	0.117
HG7-2 Composite	12.7	111.9	0.292	0.226	100	0.227
HG7-3 Composite	11.2	109.5	0.448	0.309	64	0.197
HG7-4 Composite III	13.6	107.2	0.388	0.280	84	0.234
LG1 Composite	12.8	106.3	0.430	0.301	73	0.218

Sample	Final Moisture, gravimetric,%	Final Dry Density, pcf	Final Void Ratio	Final Porosity	Final Saturation, %	Final Moisture, volumetric
LG2-1 Composite	11.4	104.0	0.470	0.320	59	0.190
LG2-2 Composite	13.0	109.3	0.306	0.234	97	0.228
LG2-3 Composite	16.1	87.2	0.722	0.419	54	0.225
LG3-1 Composite	12.3	86.9	0.695	0.410	42	0.171
LG3-2 Composite	14.4	104.5	0.449	0.310	78	0.241
LG3-3 Composite	12.1	104.5	0.449	0.310	65	0.203

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Soil Test Report
and
Fertilizer Recommendations

USU Analytical Labs
Utah State University
Logan, Utah 84322-4830
(435) 797-2217
(435) 797-2117 (FAX)

Date Received: 5/19/98
Date Completed: 6/2/98

Name: Jim Ashton
Address: Western States Minerals
250 South Rock Blvd Suite 130
Reno NV 89502

County:

Lab Number: 98010998
Identification: 1
Crop to be Grown: Reclamation

Grower's Comments:

Acres in Field:

Soil Test Results		Interpretations	Recommendations
Texture	Sandy Loam		
Lime	++	Normal	
pH	8.2	Normal	
Salinity - ECe mmhos/cm	0.4		
Phosphorus - P ppm	2.2		50-70 lbs P2O5/A
Potassium - K ppm	174		0 lbs K2O/A
Nitrate-Nitrogen - N ppm	2.8		40-70 lbs N/A
Zinc - Zn ppm			
Iron - Fe ppm			
Copper - Cu ppm			
Manganese - Mn ppm			
Sulfate-Sulfur - S ppm			
SAR	3.0	Soil Not Sodic	
Organic Matter %	0.76		

Notes
CEC = 16.2 meq/100 g
Manure is fine - the only problem might be high salts if lots of manure used.

For further assistance, please see your County Agent --

Soil Test Report
and
Fertilizer Recommendations

USU Analytical Labs
Utah State University
Logan, Utah 84322-4830
(435) 797-2217
(435) 797-2117 (FAX)

Date Received: 5/19/98
Date Completed: 6/2/98

Name: Jim Ashton
Address: Western States Minerals
250 South Rock Blvd Suite 130
Reno NV 89502

County:

Lab Number: 98010999
Identification: 2
Crop to be Grown: Reclamation

Grower's Comments:

Acres in Field:

Soil Test Results		Interpretations	Recommendations
Texture	Sandy Loam		
Lime	++	Normal	
pH	8.0	Normal	
Salinity - ECe mmhos/cm	0.4		
Phosphorus - P ppm	1.0		50-70 lbs P2O5/A
Potassium - K ppm	80		80-120 lbs K2O/A
Nitrate-Nitrogen - N ppm	1.5		40-70 lbs N/A
Zinc - Zn ppm			
Iron - Fe ppm			
Copper - Cu ppm			
Manganese - Mn ppm			
Sulfate-Sulfur - S ppm			
SAR	0.69	Soil Not Sodic	
Organic Matter %	0.68		

Notes
CEC = 13.8 meq/100 g

For further assistance, please see your County Agent --

Soil Test Report
and
Fertilizer Recommendations

USU Analytical Labs
Utah State University
Logan, Utah 84322-4830
(435) 797-2217
(435) 797-2117 (FAX)

Date Received: 5/19/98
Date Completed: 6/2/98

Name: Jim Ashton
Address: Western States Minerals
250 South Rock Blvd Suite 130
Reno NV 89502

County:

Lab Number: 98011000
Identification: 3
Crop to be Grown: Reclamation

Grower's Comments:

Acres in Field:

Soil Test Results		Interpretations	Recommendations
Texture	Sandy Loam		
Lime	++	Normal	
pH	8.7	Very High	
Salinity - ECe mmhos/cm	0.7		
Phosphorus - P ppm	2.5		50-70 lbs P2O5/A
Potassium - K ppm	97		80-120 lbs K2O/A
Nitrate-Nitrogen - N ppm	1.5		40-70 lbs N/A
Zinc - Zn ppm			
Iron - Fe ppm			
Copper - Cu ppm			
Manganese - Mn ppm			
Sulfate-Sulfur - S ppm			
SAR	15.0	Soil Is Sodic	
Organic Matter %	0.51		

Notes
CEC = 19.5 meq/100 g
Soil is sodic.

For further assistance, please see your County Agent --

Soil Test Report
and
Fertilizer Recommendations

USU Analytical Labs
Utah State University
Logan, Utah 84322-4830
(435) 797-2217
(435) 797-2117 (FAX)

Date Received: 5/19/98
Date Completed: 6/2/98

Name: Jim Ashton
Address: Western States Minerals
250 South Rock Blvd Suite 130
Reno NV 89502

County:

Lab Number: 98011001
Identification: 4
Crop to be Grown: Reclamation

Grower's Comments:

Acres in Field:

Soil Test Results		Interpretations	Recommendations
Texture	Sandy Loam		
Lime	++	Normal	
pH	8.4	Normal	
Salinity - ECe mmhos/cm	5.6		
Phosphorus - P ppm	1.3		50-70 lbs P2O5/A
Potassium - K ppm	81		80-120 lbs K2O/A
Nitrate-Nitrogen - N ppm	9.3		40-70 lbs N/A
Zinc - Zn ppm			
Iron - Fe ppm			
Copper - Cu ppm			
Manganese - Mn ppm			
Sulfate-Sulfur - S ppm			
SAR	24	Soil Is Sodic	
Organic Matter %	0.43		

Notes
CEC = 12.3 meq/100 g
Soil is sodic.

For further assistance, please see your County Agent --

Soil Test Report
and
Fertilizer Recommendations

USU Analytical Labs
Utah State University
Logan, Utah 84322-4830
(435) 797-2217
(435) 797-2117 (FAX)

Date Received: 5/19/98
Date Completed: 6/2/98

Name: Jim Ashton
Address: Western States Minerals
250 South Rock Blvd Suite 130
Reno NV 89502

County:

Lab Number: 98011002
Identification: 5
Crop to be Grown: Reclamation

Grower's Comments:

Acres in Field:

Soil Test Results		Interpretations	Recommendations
Texture	Sandy Loam		
Lime	++	Normal	
pH	8.1	Normal	
Salinity - ECe mmhos/cm	0.3		
Phosphorus - P ppm	1.9		50-70 lbs P2O5/A
Potassium - K ppm	179		0 lbs K2O/A
Nitrate-Nitrogen - N ppm	1.5		40-70 lbs N/A
Zinc - Zn ppm			
Iron - Fe ppm			
Copper - Cu ppm			
Manganese - Mn ppm			
Sulfate-Sulfur - S ppm			
SAR	2.36	Soil Not Sodic	
Organic Matter %	0.83		

Notes
CEC = 15.9 meq/100 g

For further assistance, please see your County Agent --

Soil Test Report
and
Fertilizer Recommendations

USU Analytical Labs
Utah State University
Logan, Utah 84322-4830
(435) 797-2217
(435) 797-2117 (FAX)

Date Received: 5/19/98
Date Completed: 6/2/98

Name: Jim Ashton
Address: Western States Minerals
250 South Rock Blvd Suite 130
Reno NV 89502

County:

Lab Number: 98011003
Identification: 6
Crop to be Grown: Reclamation

Grower's Comments:

Acres in Field:

Soil Test Results		Interpretations	Recommendations
Texture	Loamy Sand		
Lime	++	Normal	
pH	7.9	Normal	
Salinity - ECe mmhos/cm	4.6		
Phosphorus - P ppm	1.6		50-70 lbs P2O5/A
Potassium - K ppm	46		140-180 lbs K2O/A
Nitrate-Nitrogen - N ppm	1.3		40-70 lbs N/A
Zinc - Zn ppm			
Iron - Fe ppm			
Copper - Cu ppm			
Manganese - Mn ppm			
Sulfate-Sulfur - S ppm			
SAR	7.58	Soil Not Sodic	
Organic Matter %	0.31		

Notes
CEC = 30.1 meq/100 g

For further assistance, please see your County Agent --

Soil Test Report
and
Fertilizer Recommendations

USU Analytical Labs
Utah State University
Logan, Utah 84322-4830
(435) 797-2217
(435) 797-2117 (FAX)

Date Received: 5/19/98
Date Completed: 6/2/98

Name: Jim Ashton
Address: Western States Minerals
250 South Rock Blvd Suite 130
Reno NV 89502

County:

Lab Number: 98011004
Grower's Comments:
Acres in Field:

Identification: 7

Crop to be Grown: Reclamation

Soil Test Results		Interpretations	Recommendations
Texture	Loamy Sand		
Lime	++	Normal	
pH	8.5	High	
Salinity - ECe mmhos/cm	1.4		
Phosphorus - P ppm	1.6		50-70 lbs P2O5/A
Potassium - K ppm	111		0 lbs K2O/A
Nitrate-Nitrogen - N ppm	5.2		40-70 lbs N/A
Zinc - Zn ppm			
Iron - Fe ppm			
Copper - Cu ppm			
Manganese - Mn ppm			
Sulfate-Sulfur - S ppm			
SAR	15.0	Soil Is Sodic	
Organic Matter %	0.58		

Notes
CEC = 21.0 meq/100 g
Soil is sodic.

For further assistance, please see your County Agent --

Soil Test Report
and
Fertilizer Recommendations

USU Analytical Labs
Utah State University
Logan, Utah 84322-4830
(435) 797-2217
(435) 797-2117 (FAX)

Date Received: 5/19/98
Date Completed: 6/2/98

Name: Jim Ashton
Address: Western States Minerals
250 South Rock Blvd Suite 130
Reno NV 89502

County:

Lab Number: 98011005
Identification: 8
Crop to be Grown: Reclamation

Grower's Comments:

Acres in Field:

Soil Test Results		Interpretations	Recommendations
Texture	Sandy Loam		
Lime	++	Normal	
pH	8.0	Normal	
Salinity - ECe mmhos/cm	20.0		
Phosphorus - P ppm	3.2		50-70 lbs P2O5/A
Potassium - K ppm	57		140-180 lbs K2O/A
Nitrate-Nitrogen - N ppm	6.0		40-70 lbs N/A
Zinc - Zn ppm			
Iron - Fe ppm			
Copper - Cu ppm			
Manganese - Mn ppm			
Sulfate-Sulfur - S ppm			
SAR	36.0	Soil Is Sodic	
Organic Matter %	0.49		

Notes
CEC = 9.3 meq/100 g
Soil is sodic.

For further assistance, please see your County Agent --

Soil Test Report
and
Fertilizer Recommendations

USU Analytical Labs
Utah State University
Logan, Utah 84322-4830
(435) 797-2217
(435) 797-2117 (FAX)

Date Received: 5/19/98
Date Completed: 6/2/98

Name: Jim Ashton
Address: Western States Minerals
250 South Rock Blvd Suite 130
Reno NV 89502

County:

Lab Number: 98011006
Identification: 9
Crop to be Grown: Reclamation

Grower's Comments:

Acres in Field:

Soil Test Results		Interpretations	Recommendations
Texture	Sandy Loam		
Lime	++	Normal	
pH	8.1	Normal	
Salinity - ECe mmhos/cm	1.4		
Phosphorus - P ppm	2.4		50-70 lbs P2O5/A
Potassium - K ppm	218		0 lbs K2O/A
Nitrate-Nitrogen - N ppm	24.2		40-70 lbs N/A
Zinc - Zn ppm			
Iron - Fe ppm			
Copper - Cu ppm			
Manganese - Mn ppm			
Sulfate-Sulfur - S ppm			
SAR	2.78	Soil Not Sodic	
Organic Matter %	0.51		

Notes
CEC = 9.3 meq/100 g

For further assistance, please see your County Agent --

APPENDIX C

Hydrologic Evaluation Results

TABLE C-1
DRUM MINE RECLAMATION AND CLOSURE
RESULTS SUMMARY OF HYDROLOGIC EVALUATION
METHOD: HELP MODEL VERSION 3.05a (5 JUNE 1996)

SUMMARY TABLE - TEN YEAR PERIOD
(inches)

ITEM DESCRIPTION	LG1	LG1 AND TOPSOIL	LG2	LG2 AND TOPSOIL	LG3	LG3 AND TOPSOIL	HG1	HG1 AND TOPSOIL	HG2	HG2 AND TOPSOIL	HG3	HG3 AND TOPSOIL	HG4&5	HG4&5 AND TOPSOIL	HG6	HG6 AND TOPSOIL	HG7	HG7 AND TOPSOIL
HEAP PARAMETERS:																		
Average Thickness (ft)	20	20	35	35	35	35	25	25	20	20	35	35	45	45	30	30	25	25
Field Capacity (vol/vol)	0.218	0.218	0.214	0.214	0.205	0.205	0.251	0.251	0.26	0.26	0.137	0.137	0.108	0.108	0.224	0.224	0.194	0.194
Sat. Hyd. Cond. (cm/sec)	0.15	0.15	0.074	0.074	0.1	0.1	0.013	0.013	7E-05	7E-05	0.056	0.056	0.138	0.138	0.085	0.085	0.08	0.08
Horizontal Area (acres)	3.5	3.5	7.1	7.1	5.4	5.4	6.9	6.9	7.3	7.3	6.5	6.5	12.7	12.7	2.3	2.3	7.4	7.4
TOPSOIL PARAMETERS:																		
Average Thickness (in)	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Field Capacity (vol/vol)	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Sat. Hyd. Cond. (cm/sec)	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007
HELP RESULTS:																		
Average Precipitation	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07
Average Runoff	0.014	0.114	0.014	0.115	0.015	0.117	0.017	0.116	0.019	0.117	0.016	0.117	0.016	0.117	0.013	0.118	0.015	0.116
Average Evapotranspiration	7.02	8.76	7.85	9.06	8.25	9.26	6.708	8.523	9.554	9.691	9.47	9.64	9.62	9.75	7.49	8.97	7.5	8.91
Average Percolation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Initial Water Storage - Heap	11.592	11.592	34.56	34.56	40.18	40.18	51.336	51.336	28.476	28.476	31.97	31.97	33.67	33.67	18.23	18.23	20.28	20.28
Final Water Storage - Heap	41.2	22.3	55.43	41.81	56.9	45.23	82.904	63.26	31.872	29.309	36.71	33.47	37.06	34.56	43.05	26.7	44.81	29.2
Final Water Storage - Heap (vol/vol)	0.172	0.093	0.132	0.1	0.136	0.108	0.23	0.176	0.133	0.122	0.087	0.08	0.069	0.064	0.12	0.074	0.149	0.097
Initial Water Storage - Topsoil		0.6		0.6		0.6		0.6		0.6		0.6		0.6		0.6		0.6
Final Water Storage - Topsoil		1.1		1.11		1.11		1.104		0.805		1.12		0.81		1.11		1.11
Final Water Storage - Topsoil (vol/vol)		0.184		0.185		0.185		0.184		0.134		0.187		0.135		0.185		0.185

TABLE C-2
DRUM MINE RECLAMATION AND CLOSURE
LOW GRADE #1 WITHOUT TOPSOIL HYDROLOGIC EVLAUATION RESULTS
METHOD: HELP MODEL VERSION 3.05a (5 JUNE 1996)

HEAP PARAMETERS:

Average Thickness (ft)	20
porosity (vol/vol)	0.301
Field Capacity (vol/vol)	0.218
Wilting Point (vol/vol)	0.046
Initial Water (vol/vol)	0.046
Sat. Hyd. Cond. (cm/sec)	0.15
SCS Curve Number (Waste)	77.3
Horizontal Area (acres)	3.5

DESCRIPTION	YR-1 inches	YR-2 inches	YR-3 inches	YR-4 inches	YR-5 inches	YR-6 inches	YR-7 inches	YR-8 inches	YR-9 inches	YR-10 inches	AVERAGE inches
Precipitation	10.56	7.8	11.5	11.73	13.01	11.51	11.16	9.04	7.55	6.8	10.07
Runoff	0.061	0	0.068	0	0	0	0	0.005	0.002	0	0.014
Evapotranspiration	7.252	5.763	6.954	8.53	9.424	7.882	7.93	6.338	5.618	4.454	7.015
Percolation	0	0	0	0	0	0	0	0	0	0	0
Average Head on Liner	0	0	0	0	0	0	0	0	0	0	0
Change in Water Storage	3.247	2.037	4.479	3.2	3.586	3.628	3.23	2.698	1.929	2.346	3.038
Heap Water at Start of Year	11.592	14.839	16.876	21.354	24.554	28.141	31.306	34.998	37.456	39.625	
Heap Water at End of Year	14.839	16.876	21.354	24.554	28.141	31.306	34.998	37.456	39.625	41.786	
Snow Water at Start of Year	0	0	0	0	0	0	0.462	0	0.239	0	
Snow Water at End of Year	0	0	0	0	0	0.462	0	0.239	0	0.185	

Final Water Storage at End of Year 10 in Heap 41.2338 inches 0.1718 vol/vol

EVALUATION CONSTANTS AND ASSUMPTIONS:

HDPE Liner Thickness (in)	0.06	
HDPE Pinhole Density (holes/acre)	2	
Installation Defects (holes/acre)	1	
Placement Quality	4	Poor

LOW GRADE #1 WITH TOPSOIL HYDROLOGIC EVLAUATION RESULTS
METHOD: HELP MODEL VERSION 3.05a (5 JUNE 1996)

HEAP PARAMETERS:

Average Thickness Heap (ft)	20
porosity (vol/vol)	0.301
Field Capacity (vol/vol)	0.218
Wilting Point (vol/vol)	0.046
Initial Water (vol/vol)	0.046
Sat. Hyd. Cond. (cm/sec)	0.15
SCS Curve Number (Soil)	90.8
Horizontal Area (acres)	3.5

DESCRIPTION	YR-1 inches	YR-2 inches	YR-3 inches	YR-4 inches	YR-5 inches	YR-6 inches	YR-7 inches	YR-8 inches	YR-9 inches	YR-10 inches	AVERAGE inches
Precipitation	10.56	7.8	11.5	11.73	13.01	11.51	11.16	9.04	7.55	6.8	10.07
Runoff	0.296	0.028	0.355	0.051	0.044	0.093	0.033	0.087	0.152	0.005	0.114
Evapotranspiration	8.524	7.526	8.45	10.116	11.45	10.032	10.772	8.015	7.533	5.198	8.762
Percolation	0	0	0	0	0	0	0	0	0	0	0
Average Head on Liner	0	0	0	0	0	0	0	0	0	0	0
Change in Water Storage	1.74	0.246	2.695	1.563	1.516	1.386	0.355	0.938	-0.135	1.597	1.19
Heap Water at Start of Year	12.192	13.932	14.178	16.873	18.436	19.952	20.876	21.693	22.391	22.496	
Heap Water at End of Year	13.932	14.178	16.873	18.436	19.952	20.876	21.693	22.391	22.496	23.907	
Snow Water at Start of Year	0	0	0	0	0	0	0.462	0	0.239	0	
Snow Water at End of Year	0	0	0	0	0	0.462	0	0.239	0	0.185	

Final Water Storage at End of Year 10 in Heap 22.2508 inches 0.0927 vol/vol In Topsoil 1.1045 inches 0.1841 vol/vol

EVALUATION CONSTANTS AND ASSUMPTIONS:

HDPE Liner Thickness (in)	0.06	
HDPE Pinhole Density (holes/acre)	2	
Installation Defects (holes/acre)	1	
Placement Quality	4	Poor
Topsoil Texture	Sandy Loam	
Topsoil Thickness (in)	6	
Topsoil Porosity (vol/vol)	0.453	
TS Field Capacity (vol/vol)	0.19	
TS Wilting Point (vol/vol)	0.085	
TS Initial Water (vol/vol)	0.1	
TS Sat. Hyd. Cond. (cm/sec)	0.00072	

TABLE C-3
DRUM MINE RECLAMATION AND CLOSURE
LOW GRADE #2 WITHOUT TOPSOIL HYDROLOGIC EVLAUATION RESULTS
METHOD: HELP MODEL VERSION 3.05a (5 JUNE 1996)

HEAP PARAMETERS:

Average Thickness (ft)	35
porosity (vol/vol)	0.324
Field Capacity (vol/vol)	0.214
Wilting Point (vol/vol)	0.08
Initial Water (vol/vol)	0.08
Sat. Hyd. Cond. (cm/sec)	0.074
SCS Curve Number (Waste)	77.3
Horizontal Area (acres)	7.1

DESCRIPTION	YR-1 inches	YR-2 inches	YR-3 inches	YR-4 inches	YR-5 inches	YR-6 inches	YR-7 inches	YR-8 inches	YR-9 inches	YR-10 inches	AVERAGE inches
Precipitation	10.56	7.8	11.5	11.73	13.01	11.51	11.16	9.04	7.55	6.8	10.07
Runoff	0.068	0	0.068	0	0	0	0	0.005	0.002	0	0.014
Evapotranspiration	7.814	6.285	7.791	9.001	10.692	8.7	9.485	7.546	6.427	4.757	7.85
Percolation	0	0	0	0	0	0	0	0	0	0	0
Average Head on Liner	0	0	0	0	0	0	0	0	0	0	0
Change in Water Storage	2.678	1.515	3.641	2.729	2.318	2.81	1.675	1.489	1.121	2.043	2.202
Heap Water at Start of Year	34.56	37.238	38.753	42.394	45.122	47.44	49.789	51.926	53.175	54.535	
Heap Water at End of Year	37.238	38.753	42.394	45.122	47.44	49.789	51.926	53.175	54.535	56.393	
Snow Water at Start of Year	0	0	0	0	0	0	0.462	0	0.239	0	
Snow Water at End of Year	0	0	0	0	0	0.462	0	0.239	0	0.185	

Final Water Storage at End of Year 10 in Heap 55.4334 inches 0.132 vol/vol

EVALUATION CONSTANTS AND ASSUMPTIONS:

HDPE Liner Thickness (in)	0.06	
HDPE Pinhole Density (holes/acre)	2	
Installation Defects (holes/acre)	1	
Placement Quality	4	Poor

LOW GRADE #2 WITH TOPSOIL HYDROLOGIC EVLAUATION RESULTS
METHOD: HELP MODEL VERSION 3.05a (5 JUNE 1996)

HEAP PARAMETERS:

Average Thickness Heap (ft)	35
porosity (vol/vol)	0.324
Field Capacity (vol/vol)	0.214
Wilting Point (vol/vol)	0.08
Initial Water (vol/vol)	0.08
Sat. Hyd. Cond. (cm/sec)	0.074
SCS Curve Number (Soil)	90.8
Horizontal Area (acres)	7.1

DESCRIPTION	YR-1 inches	YR-2 inches	YR-3 inches	YR-4 inches	YR-5 inches	YR-6 inches	YR-7 inches	YR-8 inches	YR-9 inches	YR-10 inches	AVERAGE inches
Precipitation	10.56	7.8	11.5	11.73	13.01	11.51	11.16	9.04	7.55	6.8	10.07
Runoff	0.296	0.028	0.36	0.05	0.044	0.093	0.033	0.087	0.157	0.005	0.115
Evapotranspiration	8.625	7.602	8.883	10.567	11.804	10.438	10.995	8.915	7.647	5.12	9.06
Percolation	0	0	0	0	0	0	0	0	0	0	0
Average Head on Liner	0	0	0	0	0	0	0	0	0	0	0
Change in Water Storage	1.639	0.17	2.256	1.113	1.162	0.979	0.132	0.038	-0.254	1.675	0.891
Heap Water at Start of Year	35.16	36.799	36.968	39.225	40.338	41.499	42.017	42.611	42.41	42.395	
Heap Water at End of Year	36.799	36.968	39.225	40.338	41.499	42.017	42.611	42.41	42.395	43.885	
Snow Water at Start of Year	0	0	0	0	0	0	0.462	0	0.239	0	
Snow Water at End of Year	0	0	0	0	0	0.462	0	0.239	0	0.185	

Final Water Storage at End of Year 10 in Heap 41.8139 inches 0.0996 vol/vol In Topsoil 1.1109 inches 0.1852 vol/vol

EVALUATION CONSTANTS AND ASSUMPTIONS:

HDPE Liner Thickness (in)	0.06	
HDPE Pinhole Density (holes/acre)	2	
Installation Defects (holes/acre)	1	
Placement Quality	4	Poor
Topsoil Texture	Sandy Loam	
Topsoil Thickness (in)	6	
Topsoil Porosity (vol/vol)	0.453	
TS Field Capacity (vol/vol)	0.19	
TS Wilting Point (vol/vol)	0.085	
TS Initial Water (vol/vol)	0.1	
TS Sat. Hyd. Cond. (cm/sec)	0.00072	

TABLE C-4
DRUM MINE RECLAMATION AND CLOSURE
LOW GRADE #3 WITHOUT TOPSOIL HYDROLOGIC EVLAUATION RESULTS
METHOD: HELP MODEL VERSION 3.05a (5 JUNE 1996)

HEAP PARAMETERS:

Average Thickness (ft)	35
porosity (vol/vol)	0.343
Field Capacity (vol/vol)	0.205
Wilting Point (vol/vol)	0.093
Initial Water (vol/vol)	0.093
Sat. Hyd. Cond. (cm/sec)	0.1
SCS Curve Number (Waste)	77.7
Horizontal Area (acres)	5.4

DESCRIPTION	YR-1 inches	YR-2 inches	YR-3 inches	YR-4 inches	YR-5 inches	YR-6 inches	YR-7 inches	YR-8 inches	YR-9 inches	YR-10 inches	AVERAGE inches
Precipitation	10.56	7.8	11.5	11.73	13.01	11.51	11.16	9.04	7.55	6.8	10.07
Runoff	0.073	0	0.068	0	0	0	0	0.005	0.002	0	0.015
Evapotranspiration	8.523	6.837	8.094	9.492	11.409	9.12	10.096	7.54	6.725	4.849	8.249
Percolation	0	0	0	0	0	0	0	0	0	0	0
Average Head on Liner	0	0	0	0	0	0	0	0	0	0	0
Change in Water Storage	1.964	1.163	3.338	2.238	1.601	2.39	1.064	1.495	0.823	1.951	1.803
Heap Water at Start of Year	40.176	42.14	43.303	46.641	48.879	50.48	52.408	53.934	55.189	56.252	
Heap Water at End of Year	42.14	43.303	46.641	48.879	50.48	52.408	53.934	55.189	56.252	58.018	
Snow Water at Start of Year	0	0	0	0	0	0	0.462	0	0.239	0	
Snow Water at End of Year	0	0	0	0	0	0.462	0	0.239	0	0.185	

Final Water Storage at End of Year 10 in Heap 56.9016 inches 0.1355 vol/vol

EVALUATION CONSTANTS AND ASSUMPTIONS:

HDPE Liner Thickness (in)	0.06	
HDPE Pinhole Density (holes/acre)	2	
Installation Defects (holes/acre)	1	
Placement Quality	4	Poor

LOW GRADE #3 WITH TOPSOIL HYDROLOGIC EVLAUATION RESULTS
METHOD: HELP MODEL VERSION 3.05a (5 JUNE 1996)

HEAP PARAMETERS:

Average Thickness Heap (ft)	35
porosity (vol/vol)	0.343
Field Capacity (vol/vol)	0.205
Wilting Point (vol/vol)	0.093
Initial Water (vol/vol)	0.093
Sat. Hyd. Cond. (cm/sec)	0.1
SCS Curve Number (Soil)	90.9
Horizontal Area (acres)	5.4

DESCRIPTION	YR-1 inches	YR-2 inches	YR-3 inches	YR-4 inches	YR-5 inches	YR-6 inches	YR-7 inches	YR-8 inches	YR-9 inches	YR-10 inches	AVERAGE inches
Precipitation	10.56	7.8	11.5	11.73	13.01	11.51	11.16	9.04	7.55	6.8	10.07
Runoff	0.296	0.029	0.362	0.053	0.044	0.096	0.034	0.087	0.157	0.006	0.117
Evapotranspiration	9.467	7.724	9.063	10.851	12.027	10.575	11.105	8.9	7.758	5.157	9.263
Percolation	0	0	0	0	0	0	0	0	0	0	0
Average Head on Liner	0	0	0	0	0	0	0	0	0	0	0
Change in Water Storage	0.797	0.047	2.074	0.826	0.939	0.839	0.02	0.053	-0.365	1.638	0.687
Heap Water at Start of Year	40.776	41.573	41.619	43.694	44.519	45.458	45.836	46.318	46.132	46.006	
Heap Water at End of Year	41.573	41.619	43.694	44.519	45.458	45.836	46.318	46.132	46.006	47.459	
Snow Water at Start of Year	0	0	0	0	0	0	0.462	0	0.239	0	
Snow Water at End of Year	0	0	0	0	0	0.462	0	0.239	0	0.185	

Final Water Storage at End of Year 10 in Heap 45.233 inches 0.1077 vol/vol In Topsoil 1.1096 inches 0.185 vol/vol

EVALUATION CONSTANTS AND ASSUMPTIONS:

HDPE Liner Thickness (in)	0.06	
HDPE Pinhole Density (holes/acre)	2	
Installation Defects (holes/acre)	1	
Placement Quality	4	Poor
Topsoil Texture	Sandy Loam	
Topsoil Thickness (in)	6	
Topsoil Porosity (vol/vol)	0.453	
TS Field Capacity (vol/vol)	0.19	
TS Wilting Point (vol/vol)	0.085	
TS Initial Water (vol/vol)	0.1	
TS Sat. Hyd. Cond. (cm/sec)	0.00072	

TABLE C-5
DRUM MINE RECLAMATION AND CLOSURE
HIGH GRADE #1 WITHOUT TOPSOIL HYDROLOGIC EVLAUATION RESULTS
METHOD: HELP MODEL VERSION 3.05a (5 JUNE 1996)

HEAP PARAMETERS:

Average Thickness (ft)	25
porosity (vol/vol)	0.282
Field Capacity (vol/vol)	0.251
Wilting Point (vol/vol)	0.138
Initial Water (vol/vol)	0.138
Sat. Hyd. Cond. (cm/sec)	0.013
SCS Curve Number (Waste)	77.7
Horizontal Area (acres)	6.9

DESCRIPTION	YR-1 inches	YR-2 inches	YR-3 inches	YR-4 inches	YR-5 inches	YR-6 inches	YR-7 inches	YR-8 inches	YR-9 inches	YR-10 inches	AVERAGE inches
Precipitation	10.56	7.8	11.5	11.73	13.01	11.51	11.16	9.04	7.55	6.8	10.07
Runoff	0.092	0	0.07	0	0	0	0	0.006	0.004	0	0.017
Evapotranspiration	6.818	5.332	6.969	7.971	9.037	7.259	8.208	5.852	5.339	4.294	6.708
Percolation	0	0	0	0	0	0	0	0	0	0	0
Average Head on Liner	0	0	0	0	0	0	0	0	0	0	0
Change in Water Storage	3.65	2.468	4.461	3.759	3.973	4.251	2.952	3.182	2.207	2.506	3.341
Heap Water at Start of Year	51.336	54.986	57.454	61.915	65.674	69.647	73.436	76.85	79.792	82.239	
Heap Water at End of Year	54.986	57.454	61.915	65.674	69.647	73.436	76.85	79.792	82.239	84.56	
Snow Water at Start of Year	0	0	0	0	0	0	0.462	0	0.239	0	
Snow Water at End of Year	0	0	0	0	0	0.462	0	0.239	0	0.185	

Final Water Storage at End of Year 10 in Heap 82.904 inches 0.2303 vol/vol

EVALUATION CONSTANTS AND ASSUMPTIONS:

HDPE Liner Thickness (in)	0.06	
HDPE Pinhole Density (holes/acre)	2	
Installation Defects (holes/acre)	1	
Placement Quality	4	Poor

HIGH GRADE #1 WITH TOPSOIL HYDROLOGIC EVLAUATION RESULTS
METHOD: HELP MODEL VERSION 3.05a (5 JUNE 1996)

HEAP PARAMETERS:

Average Thickness Heap (ft)	25
porosity (vol/vol)	0.282
Field Capacity (vol/vol)	0.251
Wilting Point (vol/vol)	0.138
Initial Water (vol/vol)	0.138
Sat. Hyd. Cond. (cm/sec)	0.013
SCS Curve Number (Soil)	90.9
Horizontal Area (acres)	6.9

DESCRIPTION	YR-1 inches	YR-2 inches	YR-3 inches	YR-4 inches	YR-5 inches	YR-6 inches	YR-7 inches	YR-8 inches	YR-9 inches	YR-10 inches	AVERAGE inches
Precipitation	10.56	7.8	11.5	11.73	13.01	11.51	11.16	9.04	7.55	6.8	10.07
Runoff	0.296	0.028	0.36	0.052	0.044	0.097	0.035	0.087	0.157	0.006	0.116
Evapotranspiration	8.217	7.139	8.494	9.848	10.828	9.748	10.786	8.027	7.158	4.982	8.523
Percolation	0	0	0	0	0	0	0	0	0	0	0
Average Head on Liner	0	0	0	0	0	0	0	0	0	0	0
Change in Water Storage	2.047	0.633	2.646	1.83	2.137	1.665	0.339	0.926	0.236	1.812	1.427
Heap Water at Start of Year	51.936	53.983	54.616	57.262	59.091	61.229	62.432	63.233	63.92	64.396	
Heap Water at End of Year	53.983	54.616	57.262	59.091	61.229	62.432	63.233	63.92	64.396	66.023	
Snow Water at Start of Year	0	0	0	0	0	0	0.462	0	0.239	0	
Snow Water at End of Year	0	0	0	0	0	0.462	0	0.239	0	0.185	

Final Water Storage at End of Year 10 in Heap 63.262 inches 0.176 vol/vol In Topsoil 1.104 inches 0.184 vol/vol

EVALUATION CONSTANTS AND ASSUMPTIONS:

HDPE Liner Thickness (in)	0.06	
HDPE Pinhole Density (holes/acre)	2	
Installation Defects (holes/acre)	1	
Placement Quality	4	Poor
Topsoil Texture	Sandy Loam	
Topsoil Thickness (in)	6	
Topsoil Porosity (vol/vol)	0.453	
TS Field Capacity (vol/vol)	0.19	
TS Wilting Point (vol/vol)	0.085	
TS Initial Water (vol/vol)	0.1	
TS Sat. Hyd. Cond. (cm/sec)	0.00072	

TABLE C-6
DRUM MINE RECLAMATION AND CLOSURE
HIGH GRADE #2 WITHOUT TOPSOIL HYDROLOGIC EVLAUATION RESULTS
METHOD: HELP MODEL VERSION 3.05a (5 JUNE 1996)

HEAP PARAMETERS:

Average Thickness (ft)	20
porosity (vol/vol)	0.284
Field Capacity (vol/vol)	0.26
Wilting Point (vol/vol)	0.113
Initial Water (vol/vol)	0.113
Sat. Hyd. Cond. (cm/sec)	0.000073
SCS Curve Number (Waste)	77.7
Horizontal Area (acres)	7.3

DESCRIPTION	YR-1 inches	YR-2 inches	YR-3 inches	YR-4 inches	YR-5 inches	YR-6 inches	YR-7 inches	YR-8 inches	YR-9 inches	YR-10 inches	AVERAGE inches
Precipitation	10.56	7.8	11.5	11.73	13.01	11.51	11.16	9.04	7.55	6.8	10.07
Runoff	0.101	0	0.07	0	0	0	0	0.008	0.006	0	0.019
Evapotranspiration	9.833	8.027	9.513	11.287	12.465	10.951	11.559	8.558	7.96	5.383	9.554
Percolation	0	0	0	0	0	0	0	0	0	0	0
Average Head on Liner	0	0	0	0	0	0	0	0	0	0	0
Change in Water Storage	0.626	-0.227	1.916	0.443	0.545	0.559	-0.399	4.74	-0.416	1.417	0.494
Heap Water at Start of Year	28.476	29.102	28.874	30.791	31.234	31.778	31.875	31.938	32.172	31.996	
Heap Water at End of Year	29.102	28.874	30.791	31.234	31.778	31.875	31.938	32.172	31.996	33.228	
Snow Water at Start of Year	0	0	0	0	0	0	0.462	0	0.239	0	
Snow Water at End of Year	0	0	0	0	0	0.462	0	0.239	0	0.185	

Final Water Storage at End of Year 10 in Heap 31.872 inches 0.133 vol/vol

EVALUATION CONSTANTS AND ASSUMPTIONS:

HDPE Liner Thickness (in)	0.06	
HDPE Pinhole Density (holes/acre)	2	
Installation Defects (holes/acre)	1	
Placement Quality	4	Poor

HIGH GRADE #2 WITH TOPSOIL HYDROLOGIC EVLAUATION RESULTS
METHOD: HELP MODEL VERSION 3.05a (5 JUNE 1996)

HEAP PARAMETERS:

Average Thickness Heap (ft)	20
porosity (vol/vol)	0.284
Field Capacity (vol/vol)	0.26
Wilting Point (vol/vol)	0.113
Initial Water (vol/vol)	0.113
Sat. Hyd. Cond. (cm/sec)	0.000073
SCS Curve Number (Soil)	90.9
Horizontal Area (acres)	7.3

DESCRIPTION	YR-1 inches	YR-2 inches	YR-3 inches	YR-4 inches	YR-5 inches	YR-6 inches	YR-7 inches	YR-8 inches	YR-9 inches	YR-10 inches	AVERAGE inches
Precipitation	10.56	7.8	11.5	11.73	13.01	11.51	11.16	9.04	7.55	6.8	10.07
Runoff	0.296	0.028	0.363	0.05	0.045	0.096	0.037	0.091	0.156	0.004	0.117
Evapotranspiration	9.15	8.218	9.545	11.738	12.504	10.919	11.509	9.029	8.012	6.289	9.691
Percolation	0	0	0	0	0	0	0	0	0	0	0
Average Head on Liner	0	0	0	0	0	0	0	0	0	0	0
Change in Water Storage	1.114	-0.446	1.592	-0.057	0.46	0.495	-0.386	-0.081	-0.619	0.506	0.258
Heap Water at Start of Year	29.076	30.19	29.744	31.336	31.279	31.739	31.772	31.848	31.528	31.149	
Heap Water at End of Year	30.19	29.744	31.336	31.279	31.739	31.772	31.848	31.528	31.149	31.47	
Snow Water at Start of Year	0	0	0	0	0	0	0.462	0	0.239	0	
Snow Water at End of Year	0	0	0	0	0	0.462	0	0.239	0	0.185	

Final Water Storage at End of Year 10 in Heap 29.309 inches 0.1221 vol/vol In Topsoil 0.8046 inches 0.134 vol/vol

EVALUATION CONSTANTS AND ASSUMPTIONS:

HDPE Liner Thickness (in)	0.06	
HDPE Pinhole Density (holes/acre)	2	
Installation Defects (holes/acre)	1	
Placement Quality	4	Poor
Topsoil Texture	Sandy Loam	
Topsoil Thickness (in)	6	
Topsoil Porosity (vol/vol)	0.453	
TS Field Capacity (vol/vol)	0.19	
TS Wilting Point (vol/vol)	0.085	
TS Initial Water (vol/vol)	0.1	
TS Sat. Hyd. Cond. (cm/sec)	0.00072	

TABLE C-7
DRUM MINE RECLAMATION AND CLOSURE
HIGH GRADE #3 WITHOUT TOPSOIL HYDROLOGIC EVLAUATION RESULTS
METHOD: HELP MODEL VERSION 3.05a (5 JUNE 1996)

HEAP PARAMETERS:

Average Thickness (ft)	35
porosity (vol/vol)	0.371
Field Capacity (vol/vol)	0.137
Wilting Point (vol/vol)	0.074
Initial Water (vol/vol)	0.074
Sat. Hyd. Cond. (cm/sec)	0.056
SCS Curve Number (Waste)	77.7
Horizontal Area (acres)	6.5

DESCRIPTION	YR-1 inches	YR-2 inches	YR-3 inches	YR-4 inches	YR-5 inches	YR-6 inches	YR-7 inches	YR-8 inches	YR-9 inches	YR-10 inches	AVERAGE inches
Precipitation	10.56	7.8	11.5	11.73	13.01	11.51	11.16	9.04	7.55	6.8	10.07
Runoff	0.075	0	0.074	0	0	0	0	0.008	0.004	0	0.016
Evapotranspiration	9.628	7.835	9.359	10.964	12.341	11.136	10.93	9.17	7.868	5.45	9.468
Percolation	0	0	0	0	0	0	0	0	0	0	0
Average Head on Liner	0	0	0	0	0	0	0	0	0	0	0
Change in Water Storage	0.856	-0.035	2.067	0.766	0.669	0.374	0.23	-0.138	-0.323	1.35	0.582
Heap Water at Start of Year	31.968	32.824	32.789	34.856	35.622	36.291	36.203	36.895	36.518	36.434	
Heap Water at End of Year	32.824	32.789	34.856	35.622	36.291	36.203	36.895	36.518	36.434	37.6	
Snow Water at Start of Year	0	0	0	0	0	0	0.462	0	0.239	0	
Snow Water at End of Year	0	0	0	0	0	0.462	0	0.239	0	0.185	

Final Water Storage at End of Year 10 in Heap 36.7115 inches 0.0874 vol/vol

EVALUATION CONSTANTS AND ASSUMPTIONS:

HDPE Liner Thickness (in)	0.06	
HDPE Pinhole Density (holes/acre)	2	
Installation Defects (holes/acre)	1	
Placement Quality	4	Poor

HIGH GRADE #3 WITH TOPSOIL HYDROLOGIC EVLAUATION RESULTS
METHOD: HELP MODEL VERSION 3.05a (5 JUNE 1996)

HEAP PARAMETERS:

Average Thickness Heap (ft)	35
porosity (vol/vol)	0.371
Field Capacity (vol/vol)	0.137
Wilting Point (vol/vol)	0.074
Initial Water (vol/vol)	0.074
Sat. Hyd. Cond. (cm/sec)	0.056
SCS Curve Number (Soil)	90.9
Horizontal Area (acres)	6.5

DESCRIPTION	YR-1 inches	YR-2 inches	YR-3 inches	YR-4 inches	YR-5 inches	YR-6 inches	YR-7 inches	YR-8 inches	YR-9 inches	YR-10 inches	AVERAGE inches
Precipitation	10.56	7.8	11.5	11.73	13.01	11.51	11.16	9.04	7.55	6.8	10.07
Runoff	0.296	0.03	0.363	0.058	0.046	0.098	0.034	0.087	0.156	0.006	0.117
Evapotranspiration	9.196	8.25	9.548	11.704	12.585	10.965	11.819	8.619	8.14	5.559	9.639
Percolation	0	0	0	0	0	0	0	0	0	0	0
Average Head on Liner	0	0	0	0	0	0	0	0	0	0	0
Change in Water Storage	1.069	-0.48	1.588	-0.032	0.378	0.447	-0.693	0.333	-0.746	1.236	0.31
Heap Water at Start of Year	32.568	33.637	33.157	34.745	34.713	35.092	35.077	34.846	34.94	34.433	
Heap Water at End of Year	33.637	33.157	34.745	34.713	35.092	35.077	34.846	34.94	34.433	35.484	
Snow Water at Start of Year	0	0	0	0	0	0	0.462	0	0.239	0	
Snow Water at End of Year	0	0	0	0	0	0.462	0	0.239	0	0.185	

Final Water Storage at End of Year 10 in Heap 33.4713 inches 0.0797 vol/vol In Topsoil 1.1243 inches 0.1874 vol/vol

EVALUATION CONSTANTS AND ASSUMPTIONS:

HDPE Liner Thickness (in)	0.06	
HDPE Pinhole Density (holes/acre)	2	
Installation Defects (holes/acre)	1	
Placement Quality	4	Poor
Topsoil Texture	Sandy Loam	
Topsoil Thickness (in)	6	
Topsoil Porosity (vol/vol)	0.453	
TS Field Capacity (vol/vol)	0.19	
TS Wilting Point (vol/vol)	0.085	
TS Initial Water (vol/vol)	0.1	
TS Sat. Hyd. Cond. (cm/sec)	0.00072	

TABLE C-8
DRUM MINE RECLAMATION AND CLOSURE
HIGH GRADE #4&5 WITHOUT TOPSOIL HYDROLOGIC EVLAUATION RESULTS
METHOD: HELP MODEL VERSION 3.05a (5 JUNE 1996)

HEAP PARAMETERS:

Average Thickness (ft)	45
porosity (vol/vol)	0.349
Field Capacity (vol/vol)	0.108
Wilting Point (vol/vol)	0.061
Initial Water (vol/vol)	0.061
Sat. Hyd. Cond. (cm/sec)	0.138
SCS Curve Number (Waste)	77.3
Horizontal Area (acres)	12.7

DESCRIPTION	YR-1 inches	YR-2 inches	YR-3 inches	YR-4 inches	YR-5 inches	YR-6 inches	YR-7 inches	YR-8 inches	YR-9 inches	YR-10 inches	AVERAGE inches
Precipitation	10.56	7.8	11.5	11.73	13.01	11.51	11.16	9.04	7.55	6.8	10.07
Runoff	0.079	0	0.071	0	0	0	0	0.009	0.005	0	0.016
Evapotranspiration	9.408	7.498	10.319	11.16	12.668	10.67	11.459	8.969	7.642	6.398	9.619
Percolation	0	0	0	0	0	0	0	0	0	0	0
Average Head on Liner	0	0	0	0	0	0	0	0	0	0	0
Change in Water Storage	1.073	0.302	1.111	0.57	0.342	0.84	-0.299	0.062	-0.096	0.402	0.431
Heap Water at Start of Year	33.672	34.745	35.047	36.158	36.728	37.069	37.447	37.61	37.433	37.576	
Heap Water at End of Year	34.745	35.047	36.158	36.728	37.069	37.447	37.61	37.433	37.576	37.793	
Snow Water at Start of Year	0	0	0	0	0	0	0.462	0	0.239	0	
Snow Water at End of Year	0	0	0	0	0	0.462	0	0.239	0	0.185	

Final Water Storage at End of Year 10 in Heap 37.0606 inches 0.0686 vol/vol

EVALUATION CONSTANTS AND ASSUMPTIONS:

HDPE Liner Thickness (in)	0.06	
HDPE Pinhole Density (holes/acre)	2	
Installation Defects (holes/acre)	1	
Placement Quality	4	Poor

HIGH GRADE #4&5 WITH TOPSOIL HYDROLOGIC EVLAUATION RESULTS
METHOD: HELP MODEL VERSION 3.05a (5 JUNE 1996)

HEAP PARAMETERS:

Average Thickness Heap (ft)	45
porosity (vol/vol)	0.349
Field Capacity (vol/vol)	0.108
Wilting Point (vol/vol)	0.061
Initial Water (vol/vol)	0.061
Sat. Hyd. Cond. (cm/sec)	0.138
SCS Curve Number (Soil)	90.8
Horizontal Area (acres)	12.7

DESCRIPTION	YR-1 inches	YR-2 inches	YR-3 inches	YR-4 inches	YR-5 inches	YR-6 inches	YR-7 inches	YR-8 inches	YR-9 inches	YR-10 inches	AVERAGE inches
Precipitation	10.56	7.8	11.5	11.73	13.01	11.51	11.16	9.04	7.55	6.8	10.07
Runoff	0.297	0.031	0.369	0.05	0.044	0.091	0.039	0.087	0.158	0.006	0.117
Evapotranspiration	9.551	7.182	10.495	11.79	12.569	11.095	11.765	8.771	7.842	6.418	9.748
Percolation	0	0	0	0	0	0	0	0	0	0	0
Average Head on Liner	0	0	0	0	0	0	0	0	0	0	0
Change in Water Storage	0.712	0.587	0.636	-0.109	0.397	0.323	-0.643	0.181	-0.45	0.376	0.201
Heap Water at Start of Year	34.272	34.984	35.571	36.207	36.098	36.496	36.357	36.176	36.118	35.907	
Heap Water at End of Year	34.984	35.571	36.207	36.098	36.496	36.357	36.176	36.118	35.907	36.098	
Snow Water at Start of Year	0	0	0	0	0	0	0.462	0	0.239	0	
Snow Water at End of Year	0	0	0	0	0	0.462	0	0.239	0	0.185	

Final Water Storage at End of Year 10 in Heap 34.5579 inches 0.064 vol/vol In Topsoil 0.8083 inches 0.1347 vol/vol

EVALUATION CONSTANTS AND ASSUMPTIONS:

HDPE Liner Thickness (in)	0.06	
HDPE Pinhole Density (holes/acre)	2	
Installation Defects (holes/acre)	1	
Placement Quality	4	Poor
Topsoil Texture	Sandy Loam	
Topsoil Thickness (in)	6	
Topsoil Porosity (vol/vol)	0.453	
TS Field Capacity (vol/vol)	0.19	
TS Wilting Point (vol/vol)	0.085	
TS Initial Water (vol/vol)	0.1	
TS Sat. Hyd. Cond. (cm/sec)	0.00072	

TABLE C-9
DRUM MINE RECLAMATION AND CLOSURE
HIGH GRADE #6 WITHOUT TOPSOIL HYDROLOGIC EVLAUATION RESULTS
METHOD: HELP MODEL VERSION 3.05a (5 JUNE 1996)

HEAP PARAMETERS:

Average Thickness (ft)	30
porosity (vol/vol)	0.316
Field Capacity (vol/vol)	0.224
Wilting Point (vol/vol)	0.049
Initial Water (vol/vol)	0.049
Sat. Hyd. Cond. (cm/sec)	0.085
SCS Curve Number (Waste)	78.2
Horizontal Area (acres)	2.3

DESCRIPTION	YR-1 inches	YR-2 inches	YR-3 inches	YR-4 inches	YR-5 inches	YR-6 inches	YR-7 inches	YR-8 inches	YR-9 inches	YR-10 inches	AVERAGE inches
Precipitation	10.56	7.8	11.5	11.73	13.01	11.51	11.16	9.04	7.55	6.8	10.07
Runoff	0.06	0	0.068	0	0	0	0	0.005	0.002	0	0.013
Evapotranspiration	7.902	5.988	7.496	8.901	9.864	8.193	9.034	6.883	6.027	4.64	7.493
Percolation	0	0	0	0	0	0	0	0	0	0	0
Average Head on Liner	0	0	0	0	0	0	0	0	0	0	0
Change in Water Storage	2.598	1.812	3.936	2.829	3.146	3.317	2.129	2.153	1.521	2.16	2.56
Heap Water at Start of Year	18.228	20.826	22.638	26.575	29.403	32.55	35.405	37.993	39.906	41.667	
Heap Water at End of Year	20.826	22.638	26.575	29.403	32.55	35.405	37.993	39.906	41.667	43.641	
Snow Water at Start of Year	0	0	0	0	0	0	0.462	0	0.239	0	
Snow Water at End of Year	0	0	0	0	0	0.462	0	0.239	0	0.185	

Final Water Storage at End of Year 10 in Heap 43.053 inches 0.1196 vol/vol

EVALUATION CONSTANTS AND ASSUMPTIONS:

HDPE Liner Thickness (in)	0.06	
HDPE Pinhole Density (holes/acre)	2	
Installation Defects (holes/acre)	1	
Placement Quality	4	Poor

HIGH GRADE #6 WITH TOPSOIL HYDROLOGIC EVLAUATION RESULTS
METHOD: HELP MODEL VERSION 3.05a (5 JUNE 1996)

HEAP PARAMETERS:

Average Thickness Heap (ft)	30
porosity (vol/vol)	0.316
Field Capacity (vol/vol)	0.224
Wilting Point (vol/vol)	0.049
Initial Water (vol/vol)	0.049
Sat. Hyd. Cond. (cm/sec)	0.085
SCS Curve Number (Soil)	91.1
Horizontal Area (acres)	2.3

DESCRIPTION	YR-1 inches	YR-2 inches	YR-3 inches	YR-4 inches	YR-5 inches	YR-6 inches	YR-7 inches	YR-8 inches	YR-9 inches	YR-10 inches	AVERAGE inches
Precipitation	10.56	7.8	11.5	11.73	13.01	11.51	11.16	9.04	7.55	6.8	10.07
Runoff	0.296	0.028	0.361	0.059	0.046	0.104	0.035	0.087	0.157	0.006	0.118
Evapotranspiration	8.614	7.569	8.847	10.36	11.684	10.401	11.161	8.307	7.597	5.185	8.973
Percolation	0	0	0	0	0	0	0	0	0	0	0
Average Head on Liner	0	0	0	0	0	0	0	0	0	0	0
Change in Water Storage	1.65	0.202	2.292	1.311	1.281	1.005	-0.037	0.646	-0.204	1.809	0.975
Heap Water at Start of Year	18.828	20.478	20.68	22.972	24.283	25.564	26.107	26.532	26.938	26.973	
Heap Water at End of Year	20.478	20.68	22.972	24.283	25.564	26.107	26.532	26.938	26.973	28.397	
Snow Water at Start of Year	0	0	0	0	0	0	0.462	0	0.239	0	
Snow Water at End of Year	0	0	0	0	0	0.462	0	0.239	0	0.185	

Final Water Storage at End of Year 10 in Heap 26.7004 inches 0.0742 vol/vol In Topsoil 1.1088 inches 0.1848 vol/vol

EVALUATION CONSTANTS AND ASSUMPTIONS:

HDPE Liner Thickness (in)	0.06	
HDPE Pinhole Density (holes/acre)	2	
Installation Defects (holes/acre)	1	
Placement Quality	4	Poor
Topsoil Texture	Sandy Loam	
Topsoil Thickness (in)	6	
Topsoil Porosity (vol/vol)	0.453	
TS Field Capacity (vol/vol)	0.19	
TS Wilting Point (vol/vol)	0.085	
TS Initial Water (vol/vol)	0.1	
TS Sat. Hyd. Cond. (cm/sec)	0.00072	

TABLE C-10
DRUM MINE RECLAMATION AND CLOSURE
HIGH GRADE #7 WITHOUT TOPSOIL HYDROLOGIC EVLAUATION RESULTS
METHOD: HELP MODEL VERSION 3.05a (5 JUNE 1996)

HEAP PARAMETERS:

Average Thickness (ft)	25
porosity (vol/vol)	0.287
Field Capacity (vol/vol)	0.194
Wilting Point (vol/vol)	0.065
Initial Water (vol/vol)	0.065
Sat. Hyd. Cond. (cm/sec)	0.08
SCS Curve Number (Waste)	77.7
Horizontal Area (acres)	7.4

DESCRIPTION	YR-1 inches	YR-2 inches	YR-3 inches	YR-4 inches	YR-5 inches	YR-6 inches	YR-7 inches	YR-8 inches	YR-9 inches	YR-10 inches	AVERAGE inches
Precipitation	10.56	7.8	11.5	11.73	13.01	11.51	11.16	9.04	7.55	6.8	10.07
Runoff	0.076	0	0.069	0	0	0	0	0.005	0.002	0	0.015
Evapotranspiration	7.745	6.009	7.296	8.829	10.345	8.106	9.081	6.772	6.179	4.651	7.501
Percolation	0	0	0	0	0	0	0	0	0	0	0
Average Head on Liner	0	0	0	0	0	0	0	0	0	0	0
Change in Water Storage	2.739	1.791	4.135	2.901	2.665	3.404	2.079	2.263	1.368	2.149	2.549
Heap Water at Start of Year	20.28	23.019	24.81	28.945	31.846	34.511	37.453	39.994	42.017	43.625	
Heap Water at End of Year	23.019	24.81	28.945	31.846	34.511	37.453	39.994	42.017	43.625	45.588	
Snow Water at Start of Year	0	0	0	0	0	0	0.462	0	0.239	0	
Snow Water at End of Year	0	0	0	0	0	0.462	0	0.239	0	0.185	

Final Water Storage at End of Year 10 in Heap 44.8082 inches 0.1494 vol/vol

EVALUATION CONSTANTS AND ASSUMPTIONS:

HDPE Liner Thickness (in)	0.06	
HDPE Pinhole Density (holes/acre)	2	
Installation Defects (holes/acre)	1	
Placement Quality	4	Poor

HIGH GRADE #7 WITH TOPSOIL HYDROLOGIC EVLAUATION RESULTS
METHOD: HELP MODEL VERSION 3.05a (5 JUNE 1996)

HEAP PARAMETERS:

Average Thickness Heap (ft)	25
porosity (vol/vol)	0.287
Field Capacity (vol/vol)	0.194
Wilting Point (vol/vol)	0.065
Initial Water (vol/vol)	0.065
Sat. Hyd. Cond. (cm/sec)	0.08
SCS Curve Number (Soil)	90.9
Horizontal Area (acres)	7.4

DESCRIPTION	YR-1 inches	YR-2 inches	YR-3 inches	YR-4 inches	YR-5 inches	YR-6 inches	YR-7 inches	YR-8 inches	YR-9 inches	YR-10 inches	AVERAGE inches
Precipitation	10.56	7.8	11.5	11.73	13.01	11.51	11.16	9.04	7.55	6.8	10.07
Runoff	0.296	0.028	0.36	0.052	0.044	0.097	0.033	0.087	0.152	0.006	0.116
Evapotranspiration	8.571	7.519	8.832	10.453	11.482	10.293	11.153	8.032	7.605	5.169	8.911
Percolation	0	0	0	0	0	0	0	0	0	0	0
Average Head on Liner	0	0	0	0	0	0	0	0	0	0	0
Change in Water Storage	1.693	0.253	2.308	1.225	1.483	1.12	-0.027	0.921	-0.206	1.625	1.04
Heap Water at Start of Year	20.88	22.573	22.826	25.133	26.358	27.842	28.5	28.935	29.617	29.65	
Heap Water at End of Year	22.573	22.826	25.133	26.358	27.842	28.5	28.935	29.617	29.65	31.09	
Snow Water at Start of Year	0	0	0	0	0	0	0.462	0	0.239	0	
Snow Water at End of Year	0	0	0	0	0	0.462	0	0.239	0	0.185	

Final Water Storage at End of Year 10 in Heap 29.2014 inches 0.0973 vol/vol In Topsoil 1.1087 inches 0.1848 vol/vol

EVALUATION CONSTANTS AND ASSUMPTIONS:

HDPE Liner Thickness (in)	0.06	
HDPE Pinhole Density (holes/acre)	2	
Installation Defects (holes/acre)	1	
Placement Quality	4	Poor
Topsoil Texture	Sandy Loam	
Topsoil Thickness (in)	6	
Topsoil Porosity (vol/vol)	0.453	
TS Field Capacity (vol/vol)	0.19	
TS Wilting Point (vol/vol)	0.085	
TS Initial Water (vol/vol)	0.1	
TS Sat. Hyd. Cond. (cm/sec)	0.00072	

TABLE C-11
DRUM MINE RECLAMATION AND CLOSURE
HYDROLOGIC EVALUATION - WEATHER DATA

EVAPOTRANSPIRATION DATA - OBTAINED FROM DELTA, UTAH

Station Latitude (degrees)	39.38
Maximum Leaf Area Index	1
Start of Growing Season (Julian)	126
End of Growing Season (Julian)	282
Evaporative Zone Depth (in)	18
Average Annual Wind Speed (mph)	10.1
Avg. 1st QTR Relative Humidity (%)	62
Avg. 2nd QTR Relative Humidity (%)	36
Avg. 3rd QTR Relative Humidity (%)	34
Avg. 4th QTR Relative Humidity (%)	56

PRECIPITATION DATA - OBTAINED FROM DELTA, UTAH (Station 422090, Years 1978 - 1987)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1978	1.56	1.02	1.38	0.91	0.52	0.03	0.06	0.95	1.78	0.25	2	0.1	10.56
1979	0.72	1.13	1.81	0.53	1.09	0.08	0.55	0.1	0.01	1.25	0.4	0.13	7.8
1980	1.12	1.62	2.79	0.32	2.95	0.02	0.13	0.05	0.91	0.75	0.74	0.1	11.5
1981	0.24	0.2	0.63	1.41	2.88	0.35	0.42	0.21	1.23	2.49	1.09	0.58	11.73
1982	0.57	0.17	0.72	0.01	0.7	0.04	1.63	1.73	4.18	1.85	0.35	1.06	13.01
1983	0.49	0.62	1.57	1.35	0.68	0.33	0.34	1.02	1.38	0.63	1.61	1.49	11.51
1984	0.88	0.28	0.9	1.12	0.37	1.75	2.04	1.48	0.44	1.05	0.33	0.72	11.16
1985	0.51	0.39	0.71	0.17	1.25	0.61	1.05	0.08	1.04	1.17	1.14	0.92	9.04
1986	0.39	0.56	1.42	1.35	0.7	0.1	0.23	0.78	1.38	0.34	0.26	0.04	7.55
1987	0.38	0.77	1	0.06	0.52	0.09	0.81	0.52	0.24	1.07	0.76	0.58	6.8
AVERAGE	0.666	0.676	1.293	0.723	1.166	0.34	0.726	0.692	1.259	1.085	0.868	0.572	

TEMPERATURE DATA - SYNTHETICALLY GENERATED USING PRECIPITATION DATA AND COEFFICIENTS FOR DELTA, UTAH

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Normal Mean Monthly Temperature	25.5	32.2	40.3	48.6	57.8	67.1	75.5	73.6	63.6	51.3	37.1	28

SOLAR RADIATION DATA - SYNTHETICALLY GENERATED USING PRECIPITATION DATA AND COEFFICIENTS FOR MILFORD, UTAH AND STATION LATITUDE = 39.38 DEGREES

APPENDIX D

Settlement and Reclamation Agreement

SETTLEMENT AND RECLAMATION AGREEMENT

BETWEEN AND AMONG

WESTERN STATES MINERALS CORPORATION

AND

THE UNITED STATES DEPARTMENT OF INTERIOR, BUREAU OF LAND MANAGEMENT

and STATE OF UTAH, DEPARTMENT OF NATURAL RESOURCES, DIVISION OF OIL, GAS AND MINING and DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF WATER QUALITY

TABLE OF CONTENTS

1 Coordination of Agency Determinations To Be Made Under the Agreement 5

1.1 Lead Agency 5

1.2 Notices 5

1.3 Administration of the Agreement 7

2 Areas To Be Reclaimed By Western 7

3 The Sampling Plan 7

3.1 Submission and Approval 7

3.2 Implementation 8

4 The Reclamation Plan 8

4.1 Submission and Approval 8

4.2 Reclamation Standards and Monitoring. 8

4.2.1 Variances 8

4.3 Implementation 9

5 Bonding. 9

5.1 Adequacy of Existing Bond 9

5.2 Reduction of Bond once Monitoring Phase of Reclamation Plan is Reached 9

6 Status of Pending Administrative Proceedings 9

7 Time Frames and Extensions 10

8 Relationship Between Western, BLM and the Claimant/Operator of the Remaining Portions of the Drum Mine Site 10

9 Dispute Resolution and Appeal Procedures 11

9.1 Notice of Breach 11

9.2 Mediation of Disputes 11

9.2.1 Appointment of Mediator 11
9.2.2 Mediation Procedures 11
9.2.3 Costs of Mediation 11
9.2.4 Procedures in the event that mediation does not resolve the dispute 12

10 Termination of this Agreement and Release of Western 12

10.1 Termination 12

10.2 Release 12

This Settlement and Reclamation Agreement (the "Agreement") is entered into between and among WESTERN STATES MINERALS CORPORATION ("Western") on the one hand and the UNITED STATES DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT ("BLM"), and THE STATE OF UTAH, DEPARTMENT OF NATURAL RESOURCES, DIVISION OF OIL, GAS AND MINING ("DOGM") and DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF WATER QUALITY ("DWQ") (BLM, DOGM AND DWQ are each individually referred to as an "Agency," and are collectively referred to herein as the "Agencies") on the other.

RECITALS

The Utah State Director of the BLM has issued a Decision dated October 20, 1997, affirming a decision dated July 14, 1997, issued by the BLM Area Manager, and ordering, *inter alia*, that Western submit a plan of operations to reclaim specified portions of the Drum mine site in Millard County, Utah.

DOGM has commenced formal adjudicatory proceedings (Docket No. 97-009, Cause No. M/027/007) to obtain, *inter alia*, reclamation by Western of the specified portions of the site.

DWQ wishes to review and comment upon proposed reclamation plans for the Drum mine site in order to reduce the possibility that there could be any significant long-term discharge of contaminants to the subsurface from the specified portions of the site.

Western has committed to comply with the decision of the BLM State Director by submitting a plan of operations and reclaiming the specified portions of the Drum site in the manner required by the BLM's governing laws and regulations. To that end, Western has committed to perform the obligations specified in this Agreement, and it has commenced performance of those obligations by submitting a proposed sampling plan to the Agencies. The results of the sampling will be used to develop a suitable plan of operations pursuant to which Western will reclaim the specified portions of the site, in the manner set forth herein.

All parties desire to avoid the expenses, delays and other inefficiencies involved in adjudicating past, present and future disputes over Western's reclamation responsibilities at the Drum mine site. To accomplish that goal, the parties have agreed to settle and resolve all such disputes, and to terminate and resolve all pending formal adjudicatory proceedings before the Agencies by entering into this Agreement. Western's performance of the obligations imposed upon it in this Agreement shall constitute full, complete and final compliance by Western of all obligations with respect to the Drum mine site that have been or may be imposed upon it by any of the Agencies.

NOW, THEREFORE, for and in consideration of the mutual covenants set forth herein, the parties agree as follows:

1 Coordination of Agency Determinations To Be Made Under the Agreement.

1.1 Lead Agency.

As specified in the State Director's October 20, 1997, decision, since the Drum mine site occurs on federal land administered by BLM, BLM is and will remain the lead agent for all operations conducted on the site. Pursuant to the terms of the Memorandum of Understanding between DOGM and BLM concerning regulation of minerals mining and reclamation, BLM accepts lead responsibility for management of all operations and other obligations to be performed under this agreement. That responsibility shall be carried out in the manner set forth herein.

1.2 Notices.

Western shall submit copies of all plans and notices required under this agreement to each of the agencies at the addresses, or (where and when appropriate) by fax or e-mail as specified below.

BLM (State Office):
Mr. G. William Lamb
State Director
Utah State Office (UT-930)
Bureau of Land Management
P. O. Box 45155
Salt Lake City, UT 84145-0155
Phone: (801) 539-4010
Fax: (801) 539-4013 With cc to:

BLM (Area Office)
Mr. Rex Rowley, Area Manager
Bureau of Land Management
Fillmore Office
35 East 500 North
Fillmore, Utah 84631
Phone: (435) 743-3104
Fax: (435) 743-3135

Bruce Hill, Esq.
Office of the Solicitor
6201 Federal Bldg.
125 S. State Street
Salt Lake City, UT 84138-1180
Phone: (801) 524-5677 (ext. 228)
Fax: (801) 524-4506

DOGM:
Mr. D. Wayne Hedberg
Permit Supervisor
Division of Oil, Gas and Mining
1594 West North Temple, Ste. 1210
Box 145801
Salt Lake City, Utah 84114-5801
Phone: (801) 538-5286
Fax: (801) 359-3940

With cc of notices and cover letters to:
Mr. Dan Moquin
Office of the Attorney General
Natural Resources Division
1594 West North Temple, Ste. 300
Box 140855
Salt Lake City, Utah 84114-5801
Phone: (801) 538-5243
Fax: (801) 538-7440

DWQ:
Mr. Don Ostler, Director
Department of Environmental Quality
Division of Water Quality
288 North 1460 West
Salt Lake City, Utah 84116
Phone: (801) 538-6170
Fax: (801) 538-6715

Notices shall be provided to Western at the following address or fax:

WESTERN STATES MINERALS CORPORATION
Attn: John F. Carmody
4975 Van Gordon Street
Wheat Ridge, CO 80033
Phone: (303) 425-7042 ext. 23
Fax: (303) 425-6634

With cc to:
Craig R. Carver
Alfers & Carver, LLC
730 17th Street, Suite 340
Denver, CO 80202
Phone: (303) 592-7674
Fax: (303) 592-7680
e-mail: ccarver@alfers-carver.com

1.3 Administration of the Agreement.

All responses to be provided by the Agencies to Western under this agreement will be coordinated through BLM. Upon receipt of and prior to approval of any proposals submitted by Western hereunder, or any revisions thereof, the BLM will consult with and give due consideration to timely comments from DOGM and DWQ. If DOGM or DWQ cannot provide comments within 30 days of receipt of the proposal, BLM will proceed independently in processing it. Should there be any disagreement between any of the Agencies, BLM will take the lead in conducting whatever meetings or negotiations are necessary to resolve the problems, including raising the problem to the directors of the agencies for resolution, if necessary.

The Agencies shall inspect jointly or independently for compliance with all obligations of Western hereunder, and shall promptly notify the other agencies of operations not complying with such obligations.

2 Areas To Be Reclaimed By Western.

As specified in the State Director's October 20, 1997, decision, Western shall submit a plan of operations for, and shall reclaim, those portions of the Drum mine site which are identified on the attached Exhibit A as: lo-grade heap #1, lo-grade heap #2, lo-grade heap #3, hi-grade heap #6, hi-grade heap #7 (marked as HG7 and W7 on Exhibit A), one 3.6 acre waste dump (marked as W-3 on Exhibit A), one 5.2 acre waste dump (marked as W-2 on Exhibit A); plus Western shall reclaim the disturbance around Busby Spring, an unplugged drill hole above Busby Spring, and disturbances caused by exploration activities conducted under notices UT-057-39N, UT-056-64N, UT-056-062N, and unserialized notice submitted December 13, 1983 and unserialized notice submitted February 1, 1985.

In addition to the areas itemized in the BLM State Director's decision, DOGM has asserted that Western is responsible for reclamation of one 20.1 acre waste dump (marked as W-1). For and in exchange for the conditions set forth in this Agreement, Western has agreed that it shall sample and reclaim such area.

The areas identified above shall constitute, and be referred to as, the "Western Reclamation Areas." Western shall have no responsibility to reclaim any other portions of the Drum mine site.

3 The Sampling Plan.

3.1 Submission and Approval.

Western has submitted to each of the Agencies its proposed plan for sampling the characteristics of the Western Reclamation Areas. After consulting with DOGM and DWQ, BLM shall determine whether implementation of the plan as proposed will be adequate to characterize the Western Reclamation Areas for purposes of development of a reclamation plan for such areas. If so, then BLM shall provide notice to Western of its approval of the sampling plan. If not, BLM and Western shall consult in order to seek agreement on the nature and extent of any modifications needed in order to cause the plan to be adequate for such purposes. Once agreement is reached on the sampling plan, BLM shall provide Western with notice of its approval of the agreed-upon sampling plan.

3.2 Implementation.

As soon as practicable after receipt of an approved sampling plan from BLM, Western shall implement the provisions of the approved plan. All results and evaluations obtained as a consequence of implementation of the sampling plan shall be provided to the Agencies within 10 days after receipt by Western.

4 The Reclamation Plan.

4.1 Submission and Approval.

Within 60 days of Western's receipt of the results of the sampling of Western's Reclamation Areas, Western shall provide to the Agencies a detailed plan of operations to reclaim Western's Reclamation Areas in an efficient and effective manner, and in accordance with applicable laws and regulations. After consulting with DOGM and DWQ, BLM shall determine whether implementation of the plan as proposed will be adequate to reclaim the Western Reclamation Areas. If so, then BLM shall provide notice to Western of its approval of the reclamation plan. If not, BLM and Western shall consult in order to seek agreement on the nature and extent of any modifications needed in order to cause the plan to be adequate for such purposes. Once agreement is reached on the reclamation plan, BLM shall provide Western with notice of its approval of the agreed-upon reclamation plan.

4.2 Reclamation Standards and Monitoring.

Prior to commencement of reclamation activities, Western, BLM and DOGM shall mutually select an agreed-upon representative undisturbed off-site reference area and they shall inventory the density of base-line vegetative cover within such area. Unless a variance is granted under section 4.2.1 below, Western shall reclaim the Western Reclamation Areas pursuant to the requirements of R647-4-111.

4.2.1 Variances.

Western may pursue variances following the procedures mandated under R647-4-111 and R647-4-112 and this section 4.2.1. In the event that the results obtained from implementation of the Sampling and Characterization Plan establish to the reasonable satisfaction of DOGM that no specialized reclamation efforts will be required to deal with toxic materials at the site, then the amount of cover material applied to the areas to be reclaimed shall be such amount as Western, in its reasonable judgment, deems appropriate to result in the growths necessary to attain the reclamation standard imposed by R647-4-111 or a variance granted by the Division in writing.

If Western reduces the slopes of all facilities in the Western Reclamation Areas to a maximum 3 to 1 (horizontal to vertical) slope, and if Western prepares all surfaces to accept the growth media application, and if at least 6 inches of growth media are applied to all reclaimed and recontoured surfaces (with the appropriate additives applied, as determined by agronomic analyses), and if a diverse seed mix that includes adaptable perennial species native to the area is applied to all reclaimed areas, all to the reasonable standards and satisfaction of DOGM, then DOGM shall grant a variance to Western under R647-4-111.13 such that reclamation shall be deemed acceptable if the reclaimed areas have attained at least 50% of the vegetative density of

the off-site reference area within two growing seasons following the final seeding of the Western Reclamation Areas.

Notwithstanding the foregoing, if the results of Western's sampling program demonstrate the existence of hazardous materials in any of the reclamation areas that pose a realistic threat to migrate from the site into waters of the State or U.S., then BLM and DOGM shall retain all authority granted by law to impose such reclamation requirements as are appropriate to mitigate such threat.

Upon completion of the reclamation obligations as contained in the approved reclamation plan, Western shall be required to monitor the Western Reclamation Areas for the shorter of the period specified in R647-4-111.13 or any variance granted under this section.

4.3 Implementation.

As soon as practicable after receipt of an approved reclamation plan from BLM, Western shall implement the provisions of the approved plan.

5 Bonding.

5.1 Adequacy of Existing Bond.

The parties desire to increase the efficiency of the reclamation process. The parties also recognize that all activities to be conducted by Western on the Drum site are to take place on or in the immediate vicinity of previously disturbed lands. Western's activities will serve to reduce the potential impacts of the existing disturbances on the environment and the costs required to be spent in the future to reclaim the Western Reclamation Areas. Accordingly, for so long as Western remains in compliance with its obligations under this Agreement, the Agencies agree to accept Western's existing bond as adequate for purposes of securing Western's performance of its reclamation obligations hereunder. Should any of the Agencies determine that Western is not performing in conformance with its obligations under this Agreement, then at the conclusion of the dispute resolution and appeal procedures specified in Article 9 below the Agencies may separately establish any bonding obligations authorized under their governing law and regulations.

5.2 Reduction of Bond once Monitoring Phase of Reclamation Plan is Reached.

Within 45 days of the responsible Agencies' receipt of Western's written notice that their reclamation obligations have been fulfilled, a joint onsite inspection will be performed. Once the Agencies confirm and agree that the applicable reclamation performance standards have been satisfied, then DOGM shall commence proceedings to release all bond funds in excess of those necessary to accomplish actual costs of remaining reclamation or monitoring.

6 Status of Pending Administrative Proceedings.

Submission of its proposed Sampling Plan and execution of this Agreement by all parties constitutes timely compliance by Western of all requirements specified in the State Director's October 20, 1997, decision and the Area Manager's decision affirmed by such decision, and brings Western and its operations into compliance with Federal regulations.

Execution of this Agreement by all parties resolves and settles all issues between Western, DOGM and the Board of Oil, Gas and Mining, in the formal proceeding instituted before the Board entitled "In the matter of the petition filed by the Division of Oil, Gas and Mining For an Order requiring Immediate Reclamation of the Drum Mine From Western States Minerals Corporation and Jumbo Mining Company, Millard County, Utah," Docket No. 7-009, Cause No. M/027/007. Accordingly, Western and DOGM shall jointly file with the Board a notice of dismissal of Western from that proceeding.

Nothing contained in this Agreement shall release Jumbo Mining Company from any proceedings, liabilities or obligations pending or asserted or to be asserted by any of the parties to this Agreement.

7 Time Frames and Extensions.

The sampling plan addendum entitled "Addendum to the Characterization Sampling Program for Heap Leach Pads and Waste Rock Dumps Located at the Drum Mine, dated November 1997" contains tentative time frames for completion of the sampling and reclamation of Western's portion of the Drum Mine site. These time frames will be modified based on the analytical results of the sampling plan. Additional delays may be incurred due to equipment availability and weather. Western shall promptly notify BLM and DOGM of the particulars of the problem and of the additional time required to complete the obligations that are delayed by the problem. BLM and DOGM shall evaluate the problem and the delays incurred as a consequence thereof, and shall extend all affected deadlines by such period as it determines is warranted under the circumstances, which period shall not be less than any delay caused by forces outside of the reasonable control of Western.

8 Relationship Between Western, BLM and the Claimant/Operator of the Remaining Portions of the Drum Mine Site.

The activities undertaken by Western at the Drum Mine site are being conducted on unpatented mining claims on public lands of the U.S., managed by the BLM and regulated by the Agencies. Pursuant to laws and regulations governing such lands, the BLM and the State have issued orders requiring that Western undertake the reclamation activities described in this Agreement. All operations conducted by Western in conformance with such plan and any other BLM or State directives are undertaken under the authority of BLM and the State. The Drum Mine site is covered by unpatented mining claims and the portions of the site not covered by Western Reclamation Areas are operated by Jumbo Mining Company. Jumbo has recently filed for liquidation under Chapter 7 of the United States Bankruptcy Code. Consequently, the parties to this Agreement do not anticipate that any entity will operate or seek to operate the mine site during the pre-monitoring phase of Western's reclamation plan. However, should Jumbo or any successor-in-interest operate or propose to operate the site or any portion thereof, then BLM and the State shall exercise their authority and discretion under all applicable laws and regulations to either: (1) transfer all or any portion agreed to by Western of Western's obligations hereunder to the operator under such terms and conditions as are acceptable to BLM and the State; or (2) regulate operator's activities in such a manner as to prevent it from interfering with the performance of Western's obligations hereunder. In the event of a transfer of all or any portion of Western's obligations hereunder to the operator, then such transfer shall, as to the lands and

obligations affected, constitute a full, complete and irrevocable release of Western from any further obligations with respect to such lands and requirements.

9 Dispute Resolution and Appeal Procedures.

9.1 Notice of Breach.

In the event that any of the Agencies concludes that Western is not complying with its obligations hereunder, that Agency shall provide written notice to Western containing the full details of all breaches asserted to have occurred. Western shall have 30 days after receipt of such notice to either cure the asserted breaches, or dispute the assertions. Should Western dispute any of the breaches specified in the Agency notice, it shall provide a responsive notice to the Agency within 30 days of Western's receipt of the Agency's notice, setting forth the bases for its disagreement.

9.2 Mediation of Disputes.

Upon receipt of a responsive notice from Western, the Agency may work informally with Western toward resolution of the dispute. Whether or not the Agency chooses to work with Western toward resolution, it may, at any time after receipt of a responsive notice, invoke the mediation provisions of this Agreement by providing notice thereof to Western. Mediation shall be accomplished in the manner set forth in this Section 9.2.

9.2.1 Appointment of Mediator.

Within 3 days after receipt of the Agency's notice invoking mediation Western and the Agency shall meet and seek to reach agreement on the appointment of a mediator. In the event of failure to reach such agreement, each party shall present simultaneously to the other a list of five names of proposed mediators, ranked in order of preference (1 highest and 5 lowest). Each proposed mediator shall be a third party professional engineer registered in the State of Utah, with expertise in the issues raised by the dispute. The mediator selected shall be the individual who appears on the lists of both parties, with the highest total ranking. In the event that no engineer appears on both lists, then the process shall be repeated until a mediator is selected.

9.2.2 Mediation Procedures.

Within 30 days of selection of a mediator, the parties shall submit and exchange a written statement of their respective positions, along with all data and documentation deemed appropriate. Within 10 days of the written submission, the parties shall meet with the mediator and follow such procedures as are specified by the mediator in an effort to resolve the dispute. If, at the end of the mediation the parties are unable to reach agreement, then within 10 days thereafter the mediator shall submit to each party a written statement containing his or her recommended resolution of the dispute, and the bases therefore.

9.2.3 Costs of Mediation.

All fees and costs of the mediator shall be paid by Western.

9.2.4 Procedures in the event that mediation does not resolve the dispute.

If the parties to a dispute are not able to resolve their disagreement through mediation, then the Agency shall be entitled to issue such decisions and institute such procedures as are permitted by its governing rules and regulations to enforce the obligations of Western under this Agreement and under the Agency's laws, rules and regulations. In any such procedures, the mediator's recommended resolution shall be admissible evidence and both it and the testimony of the mediator may be submitted by either party.

10 Termination of this Agreement and Release of Western.

10.1 Termination.

Western shall notify the Agencies upon completion of its obligations hereunder. Western's obligations hereunder shall be deemed to be completed when Western's Reclamation Area has been revegetated to establish a diverse, effective and permanent vegetative cover in compliance with the requirements of Section 4.2 and the approved reclamation plan, and when any effluent discharged from such Area has met, without violations and without the necessity for additional treatment, applicable effluent limitations and water quality standards for at least 1 full year. BLM shall promptly inspect the reclaimed area with Western and will then notify Western in writing if it concurs that Western has successfully completed all such requirements, or, if it does not, then what requirements remain to be met. At such time as BLM and DOGM have concurred in writing that Western has successfully completed all its requirements hereunder, then DOGM shall release Western's remaining bond, and this Agreement shall terminate.

10.2 Release.

Termination of this Agreement in the manner specified in paragraph 10.1 above shall constitute the Agencies' full release of Western from any and all future obligations and responsibilities with respect to the Drum Mine site.

WESTERN STATES MINERALS CORPORATION

By Arden B. Morrow

Name Arden B. Morrow

Title President

UNITED STATES DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT

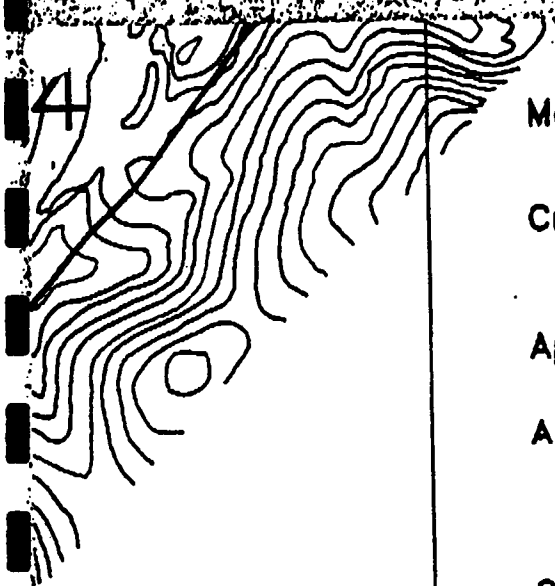
By G. William Lamb
Name G. William Lamb
Title STATE DIRECTOR 3/30/98

THE STATE OF UTAH, DEPARTMENT OF NATURAL RESOURCES, DIVISION OF OIL, GAS AND MINING

By Lowell P Braxton 3/31/98
Name Lowell P. Braxton
Title Acting Director

DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF WATER QUALITY

By Dan A. Ostler
Name Dan A. Ostler
Title Director



Main Access Road

Cross-Section Line

Approximate Project Boundary.

Approximate Project Boundary.

Components assessed as WSMC's responsibility for characterization.

EXHIBIT A

N

0 200
FEET

WESTERN STATES MINERALS CORP.

DRUM PROJECT
DELTA, UTAH
(Sections 7 and 18, T15S, R10W)

APPROXIMATE FINAL TOPOGRAPHY

D:\ACAD\DRUM\DRUMFINL.dwg

Addendum

This is an addendum to a Settlement and Reclamation Agreement ("Agreement") entered into between and among Western States Minerals Corporation and the United States Department of the Interior, Bureau of Land Management, and the State of Utah, Department of Natural Resources, Division of Oil, Gas and Mining and Department of Environmental Quality, Division of Water Quality. This addendum is only between Western States Minerals Corporation ("Western") and the Utah Department of Environmental Quality, Division of Water Quality ("DWQ").

This addendum is executed as an alternative to revising the Agreement. The parties to the Agreement desire that Western be able to immediately proceed with the activities outlined in the Agreement without having to revise the Agreement and obtain required approvals for the revision. Inasmuch as this addendum does not affect the parties to the Agreement, except as between Western and DWQ, it is executed separately. The Agreement is not acceptable to DWQ without this further addendum.

Western and DWQ agree that:

1. Nothing in the Agreement, to include the Recitals and paragraph 10, shall constitute or be construed as a release from any claim, to include a natural resource damage claim, which the State of Utah in its trust responsibilities may have against Western arising out of or relating to the release of pollutants to waters of the State by Western.

2. Nothing in the Agreement, to include paragraph 4, shall constitute or be construed to preclude DWQ from taking action to enforce compliance by Western with State permits or State laws with respect to ground water and surface water.

3. Western acknowledges that DWQ has not by the language and provisions of the Agreement, to include paragraphs 3 and 4, delegated or granted to BLM or DOGM any authority under State water quality laws over which it has jurisdiction.

4. Western acknowledges that even though the language in paragraphs 5 and 8 of the Agreement refers to "Agencies" and the "State," the determinations and responsibilities under those paragraphs are that of the Department of Natural Resources, Division of Oil Gas and Mining, and not the Department of Environmental Quality, Division of Water Quality.

Dated this 9th day of April, 1998.

WESTERN STATES MINERALS CORPORATION

By _____
Name: Arden B. Morrow
Title: President

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WATER QUALITY

By _____
Name: Don Ostler
Title: Director

This page is a reference page used to track documents internally for the Division of Oil, Gas and Mining

Mine Permit Number M0270007 Mine Name Drum Mine
Operator Western States Mineral Date December 9, 1998
TO _____ FROM _____

__CONFIDENTIAL __BOND CLOSURE __LARGE MAPS X EXPANDABLE
__MULTIPUL DOCUMENT TRACKING SHEET __NEW APPROVED NOI
__AMENDMENT _OTHER _____

Description YEAR-Record Number

__NOI X Incoming __Outgoing __Internal __Superceded

Draft Reclamation/Closure Plan

___NOI __Incoming __Outgoing __Internal __Superceded

__NOI __Incoming __Outgoing __Internal __Superceded

__NOI __Incoming __Outgoing __Internal __Superceded

__TEXT/ 81/2 X 11 MAP PAGES __11 X 17 MAPS __LARGE MAP

COMMENTS: _____

CC: _____